Financing Capital Tax Cuts: Aggregate, Distributional, and Welfare Effects*

Saroj Bhattarai† UT Austin
Jae Won Lee‡ Seoul National Univ.
Woong Yong Park§ Seoul National Univ.
Choongryul Yang¶ FRB Atlanta

Abstract

In a New Keynesian model with capital-skill complementarity and two household types—skilled Ricardian and unskilled hand-to-mouth—we study how financing choices shape the effects of a permanent capital tax cut from 35% to 21%. Transfer cuts deliver the largest long-run output gain but also the largest rise in inequality. Labor and consumption tax financing dampen the expansion via labor-supply distortions, but consumption tax financing—with a broader effective tax base—is less distortionary and uniquely yields positive welfare gains for both household types. Temporary monetary accommodation eliminates the short-run contraction induced by nominal rigidities and further raises the unskilled gain.

JEL Classification: E62, E63, E52, E58, E31
Keywords: Capital tax cut; Distortionary financing; Capital-skill complementarity; Inequality; Monetary-fiscal interactions; Welfare

*This paper was formerly circulated under the title: "Macroeconomic Effects of Capital Tax Rate Changes." We are grateful to Scott Baker, Martin Beraja, Oli Coibion, Kerem Coşar, Chris House, Hashmat Khan, Minjoon Lee, Philipp Lieberknecht, Karel Mertens, Ezra Oberfield, Valerie Ramey, Eric Young, and seminar and conference participants at UT Austin, Carleton University, Frontiers of Monetary Policy and Financial Studies Workshop at Bank of Canada, Midwest Macro conference, North American Econometric Society Summer meetings, Macroeconomic Modeling and Model Comparison Network conference at Stanford University, and Richmond Fed–University of Virginia workshop, for helpful comments and suggestions. The views expressed here are those of the authors and do not necessarily reflect those of the Federal Reserve Bank of Atlanta or the Federal Reserve System. First version: Jan 2018; This version: July 2026.

†2225 Speedway, Stop C3100, Austin, TX 78712, U.S.A. Email: saroj.bhattarai@austin.utexas.edu.
‡1 Gwanak-ro, Gwanak-gu, Seoul 08826, South Korea. Email: jwlee7@snu.ac.kr.
§1 Gwanak-ro, Gwanak-gu, Seoul 08826, South Korea. Email: woongyong.park@snu.ac.kr.
¶1000 Peachtree Street, Atlanta, GA 30303, U.S.A. Email: choongryul.yang@atl.frb.org.

1 Introduction

The effects of capital tax cuts cannot be evaluated from changes in the statutory rate alone. Their macroeconomic effects depend on the policies that make the rate cut feasible from the budgetary perspective and, in the short run, on whether and how monetary policy accommodates the transition to the long run. This issue is central to U.S. fiscal policy debates. The Tax Cuts and Jobs Act (TCJA) of 2017 permanently reduced the statutory corporate rate from 35% to 21%, the largest such cut since 1986. Recent policy has kept the financing question salient: the 2025 One Big Beautiful Bill Act made permanent or extended several TCJA-era business provisions, including 100-percent bonus depreciation for eligible property and rules affecting interest deductibility. These policy changes raise a common question: what are the aggregate and distributional consequences of a capital tax cut once financing and the monetary-fiscal transition are modeled jointly?

Financing is the first margin we analyze. A capital tax cut creates a revenue loss unless the economy operates on the extreme side of the Laffer curve. This loss can be absorbed through lower transfers, higher labor taxes, or higher consumption taxes, and these instruments burden different households and affect different behavioral margins. Therefore, the financing instrument determines not only how much output increases, but also who gains and who loses.

Transition dynamics add a second margin that requires a careful examination. A permanent capital tax cut of the TCJA's magnitude operates through capital accumulation, which is inherently slow: the capital stock approaches its new long-run level only after many years, and the short-run paths of output, investment, consumption, and inflation can differ substantially—in magnitude and even in sign—from their long-run responses. With nominal rigidities, this path also depends on how monetary policy reacts to the inflation response generated by the tax cut. Temporary monetary accommodation allows inflation to absorb part of the fiscal adjustment by reducing the real value of government debt, and can therefore alter the transition. We capture this distinction using the funded/unfunded debt decomposition of Bianchi, Faccini and Melosi (2023) applied to the fiscal financing of the tax cut: the funded component is backed by future fiscal adjustment, while the unfunded component is absorbed through inflation. This approach allows us to study monetary accommodation during the transition without assuming that tax policy abandons long-term solvency.

Evaluating these margins jointly requires a unified framework that combines financing-driven distributional changes with monetary-fiscal transition dynamics. We therefore study

these issues in a quantitative dynamic general equilibrium model with three features absent from most prior analyses of corporate tax reform: (i) capital-skill complementarity (Krusell, Ohanian, Ríos-Rull and Violante, 2000, He and Liu, 2008), so that capital deepening raises skilled wages relative to unskilled wages; (ii) a Two-Agent New Keynesian (TANK) structure with skilled Ricardian and unskilled hand-to-mouth households whose consumption tracks current disposable income, making consumption inequality endogenous; and (iii) monetary and fiscal policy rules that interact during the transition to the new long-run equilibrium. The novelty is not any single ingredient but their interaction: financing choices, capital-skill complementarity, household liquidity constraints, and monetary-fiscal transition dynamics jointly shape the aggregate, distributional, and welfare effects of the reform. The model is a deliberately clean laboratory for studying a TCJA-style permanent corporate rate cut: it captures the permanent 35%-to-21% rate reduction, while abstracting from individual income tax provisions, temporary bonus depreciation, interest-deductibility limits, international provisions, repatriation, and partial anticipation. These abstractions let us isolate how financing choices and monetary policy shape the incidence and welfare consequences of a large permanent capital tax cut.

Our main findings are as follows. First, the financing mechanism is a first-order determinant of both aggregate and distributional outcomes. Lump-sum transfer cuts produce the largest long-run output gain (+2.9%) but also the greatest increase in the skill premium (+2.8%) and consumption inequality; labor tax increases generate a smaller output expansion (+1.2%) with more moderate distributional effects; and consumption tax increases (+1.7% output increase) produce the most favorable unskilled outcome. The ordering reflects two margins. On aggregate, less distortionary financing raises output more: transfer cuts impose no labor-supply distortion, while labor and consumption tax increases reduce hours worked. Consumption taxes are less distortionary than labor taxes because their effective tax base is broader: it includes spending out of capital income and transfers in addition to labor income, so a smaller rate increase matches the revenue raised by a larger labor tax hike. On distribution, the financing instrument determines whose disposable income absorbs the loss: transfers are concentrated on hand-to-mouth households, so transfer cuts impose the largest consumption loss on the unskilled, while labor and consumption tax increases spread the burden more broadly across household types. Notably, consumption taxes are less harmful to the unskilled in general equilibrium than their partial-equilibrium incidence would suggest. Because these welfare effects combine the long-run gains with the short-run transition, a household that absorbs the financing burden—the

unskilled under transfer financing, whose transfers are cut—can suffer a lifetime welfare loss even when aggregate output rises.

Second, the short-run effects depend critically on the monetary-fiscal policy mix. Under a standard Taylor rule, the economy contracts on impact—output and consumption of both household types fall—regardless of the fiscal financing scheme. When monetary policy temporarily accommodates the fiscal expansion, this contraction is eliminated, and output rises immediately. By allowing inflation to absorb part of the fiscal adjustment, accommodation reduces the real value of nominal government debt and lowers the real interest rate during the transition, both of which support demand on impact.

Third, consumption-tax financing is the only scheme that delivers positive lifetime welfare gains for both household types, even under standard monetary policy. Temporary monetary accommodation makes the transition expansionary and raises the unskilled welfare gain—consumption tax financing combined with accommodation produces the largest unskilled gain among all specifications considered—but does not raise skilled welfare, which is marginally lower; both types' gains nonetheless remain positive. This asymmetry reflects a redistributive channel: accommodation permits inflation that erodes the real value of the nominal government debt held by skilled households, to the benefit of the unskilled. This welfare ranking hinges on the full transition path: long-run-only comparisons would miss the short-run consumption losses that determine which household types gain or lose, a margin typically absent from studies of capital tax reform. The central implication is that the effects of capital tax reform cannot be evaluated independently of the fiscal financing scheme and the monetary-fiscal policy regime governing transition dynamics.

We compare the model's predictions with post-TCJA evidence and model-based assessments in the literature. Our predicted revenue decline (44%) closely matches the actual 40% drop in corporate tax revenue, and the model's distributional prediction—that wage gains concentrate at the top of the earnings distribution—is consistent with the firm-level wage evidence of Kennedy, Dobridge, Landefeld and Mortenson (2026). The aggregate investment response was muted and difficult to attribute cleanly to the tax cut, but firm-level evidence in Chodorow-Reich, Smith, Zidar and Zwick (2024a) and asset-category-level evidence in Hartley, Hassett and Rauh (2026) support the user-cost mechanism underlying the model's capital-deepening channel. Our labor tax adjustment case (+1.2% in long-run GDP) is broadly in line with the DSGE estimates of Lieberknecht and Wieland (2019) and the dynamic scoring estimates of the Congressional

Budget Office (CBO) and Joint Committee on Taxation (JCT) (CBO, 2018, JCT, 2017).[1]

Our paper contributes to several literatures. First, on the *aggregate effects of capital taxation*, we build on the Laffer curve analysis of Trabandt and Uhlig (2011) and the TCJA assessment of Barro and Furman (2018) by adding endogenous labor supply, household heterogeneity, and full nonlinear transition dynamics. The broader DSGE literature on distortionary taxation typically focuses on transitory or small tax changes and abstracts from detailed distributional analysis (*e.g.,* Leeper, Plante and Traum, 2010, Sims and Wolff, 2018). A separate strand contrasts consumption taxation with income or labor taxation in models of fundamental tax reform (*e.g.,* Coleman, 2000, Altig, Auerbach, Kotlikoff, Smetters and Walliser, 2001, Nguyen, Onnis and Rossi, 2021). We differ from both strands by studying a large, permanent capital tax cut across multiple financing schemes—including consumption taxation—in a New Keynesian TANK environment with capital-skill complementarity and monetary accommodation. We also conduct welfare evaluation by household type.

Second, on the *distributional effects of tax reform*, we complement Domeij and Heathcote (2004) and Slavík and Yazici (2019)—who employ richer household heterogeneity but abstract from nominal frictions and monetary policy—in three ways: we compare financing schemes including consumption taxation, which has received little attention in prior distributional analyses; we show that the monetary-fiscal regime during the transition shapes the welfare ranking across financing schemes; and we identify a financing scheme (consumption taxation) under which both skilled and unskilled households experience positive welfare gains in our baseline calibration, with temporary monetary accommodation amplifying the unskilled gain. Our use of the TANK framework connects to a growing literature on fiscal policy with household heterogeneity, such as Galí, López-Salido and Vallés (2007) and Bilbiie, Monacelli and Perotti (2013), which analyze government spending in TANK models. Capital taxation has received little attention in this literature, even when capital accumulation is present.

Third, on *monetary-fiscal interactions*, we extend the fiscal theory tradition by implementing the Bianchi et al. (2023) funded/unfunded decomposition in a model with capital-skill complementarity and household heterogeneity. Our use of this decomposition also connects to Bianchi and Melosi (2017), who show that the effects of fiscal disturbances depend on the monetary-fiscal policy mix and on beliefs about fiscal backing. Bhattarai, Lee and Yang (2023) study how

[1]We view these comparisons as external validation of the mechanisms, but not as a claim that the model fully accounts for the TCJA episode.

redistribution effectiveness depends on the monetary-fiscal regime; our analysis complements theirs by focusing on capital tax financing rather than transitory transfers and by incorporating capital-skill complementarity. Finally, we relate to the empirical tax multiplier literature (Romer and Romer, 2010, Blanchard and Perotti, 2002, Mountford and Uhlig, 2009, House and Shapiro, 2008), which finds significant macroeconomic effects of tax changes but does not distinguish permanent from transitory components or assess distributional consequences. Mertens and Ravn (2013) are particularly close to our analysis: they find that corporate tax cuts raise investment while leaving consumption flat or lower and employment unchanged on impact—a pattern broadly consistent with our model's short-run dynamics under a standard Taylor rule.

Section 2 presents the model. Section 3 derives analytical long-run results and reports the calibration and quantitative effects. Section 4 studies transition dynamics, including monetary accommodation via the funded/unfunded decomposition. Section 5 evaluates welfare. Section 6 compares the model with post-TCJA evidence and related model-based studies. Section 7 presents robustness exercises, and Section 8 concludes.

2 Model

We now present a quantitative dynamic model framework augmented with two types of workers (skilled and unskilled) and two types of capital (structures and equipment). We introduce equipment capital-skill complementarity following Krusell et al. (2000). Moreover, the households are heterogeneous: the skilled household makes consumption/savings decisions while the unskilled household is "hand-to-mouth". This framework allows us to study aggregate implications as well as wage and consumption inequality implications of a capital tax rate change in a unified way. The model features adjustment costs in investment, variable capacity utilization, and nominal pricing frictions to enable a realistic study of transition dynamics.

2.1. Households

There are two types of households that supply skilled labor (type s) and unskilled labor (type u), respectively. The measure of type-i household for $i \in \{s,u\}$ is denoted by N^i. The skilled households are "Ricardian", and their problem is to

$$\max_{\left\{C_t^s, H_t^s, B_t^s, I_{b,t}^s, I_{e,t}^s, \hat{K}_{b,t+1}^s, \hat{K}_{e,t+1}^s, u_{e,t}^s, u_{b,t}^s\right\}} E_0\left\{\sum_{t=0}^{\infty} \beta^t U\left(C_t^s, H_t^s\right)\right\}$$

subject to a sequence of flow budget constraints

$$\begin{aligned}\left(1+\tau_t^C\right)P_tC_t^s+P_tI_{b,t}^s+P_tI_{e,t}^s+B_t^s=&\left(1-\tau_t^H\right)W_t^sH_t^s+R_{t-1}B_{t-1}^s+\lambda_b\tau_t^KP_tI_{b,t}^s+\lambda_e\tau_t^KP_tI_{e,t}^s\\&+\left(1-\tau_t^K\right)R_t^{K,b}u_{b,t}^s\hat{K}_{b,t}^s+\left(1-\tau_t^K\right)R_t^{K,e}u_{e,t}^s\hat{K}_{e,t}^s\\&-P_t\left(1-\lambda_b\tau_t^K\right)\mathscr{A}_b\left(u_{b,t}^s\right)\hat{K}_{b,t}^s-\frac{P_t}{q_t}\left(1-\lambda_e\tau_t^K\right)\mathscr{A}_e\left(u_{e,t}^s\right)\hat{K}_{e,t}^s+P_t\frac{\chi_\Phi^s}{N^s}\Phi_t+P_t\frac{\chi_S^s}{N^s}S_t,\end{aligned}$$

where E_t is the mathematical expectation operator, C_t^s is consumption, H_t^s is hours, and $I_{b,t}^s$ and $I_{e,t}^s$ are investment in the capital stock of structures and equipment denoted by $\hat{K}_{b,t}^s$ and $\hat{K}_{e,t}^s$, respectively. Similarly, $K_{b,t}^s\equiv u_{b,t}^s\hat{K}_{b,t}^s$ and $K_{e,t}^s\equiv u_{e,t}^s\hat{K}_{e,t}^s$ are the effective structure and equipment capital and $u_{b,t}^s$ and $u_{e,t}^s$ are the respective variable capacity utilization rates. $\mathscr{A}_b(u_{b,t}^s)$ and $\mathscr{A}_e(u_{e,t}^s)$ are the costs of variable capital utilization.

The skilled Ricardian households trade nominal riskless one-period government bonds B_t^s. They are paid a fraction χ_Φ^s of the aggregate profits Φ_t from the firms and a fraction χ_S^s of the aggregate lump-sum transfers S_t from the government. The aggregate price level is P_t, W_t^s is the nominal wage for skilled households, R_t is the nominal one-period interest rate, and $R_t^{K,b}$ and $R_t^{K,e}$ are the rental rate of capital structures and equipment, respectively. The government levies taxes on consumption, labor income, and capital income with tax rates τ_t^C, τ_t^H, and τ_t^K, respectively. The parameters λ_b and λ_e are the rates of expensing of capital investment in structures and equipment, respectively. The discount factor is β. The evolutions of the two types of capital stock are described by

$$\hat{K}_{b,t+1}^s=(1-d_b)\hat{K}_{b,t}^s+\left(1-\mathscr{S}\left(\frac{I_{b,t}^s}{I_{b,t-1}^s}\right)\right)I_{b,t}^s,\quad \hat{K}_{e,t+1}^s=(1-d_e)\hat{K}_{e,t}^s+\left(1-\mathscr{S}\left(\frac{I_{e,t}^s}{I_{e,t-1}^s}\right)\right)I_{e,t}^sq_t,$$

where q_t is the relative price between investment in capital structures and equipment, and d_b and d_e are the rates of depreciation of the capital stock invested in structures and equipment, respectively.$\mathscr{S}\left(\frac{I_t}{I_{t-1}}\right)$ represent investment adjust cost.

The unskilled households are "hand-to-mouth" (HTM), and their problem is to

$$\max_{\{C_t^u,H_t^u\}}\ U\left(C_t^u,H_t^u\right)$$

subject to a flow budget constraint

$$\left(1+\tau_t^C\right)P_tC_t^u=\left(1-\tau_t^H\right)W_t^uH_t^u+P_t\frac{\chi_\Phi^u}{N^u}\Phi_t+P_t\frac{\chi_S^u}{N^u}S_t,$$

where C_t^u is their consumption and H_t^u is hours. The unskilled HTM households are paid a fraction χ_Φ^u of the aggregate profits Φ_t from the firms and a fraction χ_S^u of the aggregate lump-

sum transfers S_t from the government. W_t^u is the nominal wage for unskilled households.[2]

2.2. Firms

The model has final goods firms and intermediate goods firms. Perfectly competitive final goods firms produce aggregate output Y_t by combining a continuum of differentiated intermediate goods, indexed by $i \in [0,1]$, using the CES aggregator given by $Y_t = \left(\int_0^1 Y_t(i)^{\frac{\theta-1}{\theta}} di\right)^{\frac{\theta}{\theta-1}}$, where $\theta > 1$ is the elasticity of substitution between intermediate goods. The corresponding optimal price index P_t for the final good is $P_t = \left(\int_0^1 P_t(i)^{1-\theta} di\right)^{\frac{1}{1-\theta}}$, where $P_t(i)$ is the price of intermediate good i and the optimal demand for good i is $Y_t(i) = \left(\frac{P_t(i)}{P_t}\right)^{-\theta} Y_t$. The final good is used for private and government consumption as well as investment in capital structures and equipment.

Monopolistically competitive intermediate goods firms, indexed by i, produce output using a CRS production function $F(.)$

$$Y_t(i) = F\left(A_t, K_{b,t}(i), K_{e,t}(i), L_{s,t}(i), L_{u,t}(i)\right), \tag{2.1}$$

where A_t is an exogenous process that represents technological progress, with its gross growth rate given by $a_t \equiv \frac{A_t}{A_{t-1}} = \bar{a}$.[3] As we describe in detail later, we follow Krusell et al. (2000) in functional form assumptions on $F(.)$, a nested CES formulation, and parameterizations of the elasticities of substitution across factors, such that it features (equipment) capital-skill complementarity. Firms rent the two types of capital and hire the two types of labor in perfectly competitive factor markets.

Intermediate goods firms face nominal rigidity via a standard Calvo friction. A firm resets its price optimally with probability $1-\alpha_P$ every period. Firms that do not optimize adjust their price according to the indexation rule $P_t(i) = P_{t-1}(i)\pi_{t-1}^{\gamma_P}\bar{\pi}^{1-\gamma_P}$, where γ_P measures the extent of dynamic indexation and $\bar{\pi}$ is the steady-state value of the gross inflation rate $\pi_t \equiv P_t/P_{t-1}$.

Optimizing firms choose a common price P_t^* to solve their problem

$$\max_{\{P_t^*, L_{s,t+k}(i), L_{u,t+k}(i), K_{b,t+k}(i), K_{e,t+k}(i)\}} E_t\left\{\sum_{k=0}^{\infty}\left(\alpha_p\beta\right)^k \frac{\Lambda_{t+k}}{\Lambda_t} P_{t+k}\Phi_{t+k}(i)\right\},$$

subject to Equation (2.1), where Λ_t is the marginal utility of nominal income of the skilled

[2] The period utility $U(C_t, H_t)$, investment adjustment cost $\mathscr{S}\left(\frac{I_t}{I_{t-1}}\right)$, and variable capacity utilization cost $\mathscr{A}(u_t)$ have standard properties, which are detailed later.

[3] Steady-state of a variable x is denoted by $\bar{x}$ throughout. As we discuss later, we restrict preferences and technology such that the model is consistent with balanced growth.

household[4] and flow profit $\Phi_t(i)$ is given by

$$\Phi_{t+k}(i) = \frac{P_t^*}{P_{t+k}} X_{P,t,k} Y_{t,t+k}(i) - \frac{W_{t+k}^u}{P_{t+k}} L_{u,t+k}(i) - \frac{W_{t+k}^s}{P_{t+k}} L_{s,t+k}(i) - \frac{R_{t+k}^{K,b}}{P_{t+k}} K_{b,t+k}(i) - \frac{R_{t+k}^{K,e}}{P_{t+k}} K_{e,t+k}(i),$$

where

$$X_{P,t,k} = \begin{cases} (\pi_t \pi_{t+1} \cdots \pi_{t+k-1})^{\gamma_P} \bar{\pi}^{(1-\gamma_P)k}, & k \geq 1 \\ 1 & k = 0 \end{cases} \quad \text{and} \quad Y_{t,t+k}(i) = \left(\frac{P_t^* X_{P,t,k}}{P_{t+k}} \right)^{-\theta} Y_{t+k}.$$

Note that there is an endogenous skill premium in the model, which we define as the wage of skilled labor relative to that of unskilled labor, $\frac{W_t^s}{W_t^u}$. Given the CRS production function and the assumption of perfectly competitive factor markets, the factor prices are equal to marginal products of each factor multiplied by firms' marginal costs. Moreover, as we show in detail later, if capital-skill complementarity exists, the skill premium increases in the amount of equipment capital when the quantities of the two types of labor inputs are held fixed. It is also increasing in the ratio of unskilled to skilled labor.

2.3. Government

We now describe the government budget and determination of monetary and fiscal policy.

2.3.1. Government budget constraint. The government budget constraint, written by expressing fiscal variables as ratio of output, is

$$\frac{B_t}{P_t Y_t} + \tau_t^C \frac{C_t}{Y_t} + \tau_t^H \left(\frac{W_t^s}{P_t Y_t} L_{s,t} + \frac{W_t^u}{P_t Y_t} L_{u,t} \right) + \tau_t^K \sum_{i \in \{b,e\}} \left(\frac{R_t^{K,i}}{P_t Y_t} K_{i,t} - \lambda_i \frac{I_{i,t} + \mathscr{AC}_{i,t}}{Y_t} \right) = R_{t-1} \frac{B_{t-1}}{P_{t-1} Y_{t-1}} \frac{1}{\pi_t} \frac{Y_{t-1}}{Y_t} + \frac{G_t}{Y_t} + \frac{S_t}{Y_t},$$

where $B_t = N^s B_t^s$, $S_t = \sum_{i \in \{s,u\}} N^i S_t^i$, $S_t^i = \frac{\chi_S^i}{N^i} S_t$, $\mathscr{AC}_{b,t} = N^s \mathscr{A}_b(u_{b,t}^s) \hat{K}_{b,t}^s$, $\mathscr{AC}_{e,t} = N^s \mathscr{A}_e(u_{e,t}^s) \hat{K}_{e,t}^s$, and G_t is government spending on the final good.[5]

2.3.2. Monetary policy. The monetary policy is given by a feedback rule as in Coibion and Gorodnichenko (2011),

$$\frac{R_t}{\bar{R}} = \left[\frac{R_{t-1}}{\bar{R}} \right]^{\rho_1^R} \left[\frac{R_{t-2}}{\bar{R}} \right]^{\rho_2^R} \left[\left(\frac{\pi_t}{\bar{\pi}} \right)^{\phi_\pi} \left(\frac{Y_t}{Y_{t-1}} \right)^{\phi_{\Delta y}} \left(\frac{Y_t}{Y_t^n} \right)^{\phi_x} \right]^{(1-\rho_1^R-\rho_2^R)}, \tag{2.2}$$

[4] While we have written the model generally above in terms of profit distribution to households, we assume that firm profits go to the skilled households in our baseline parameterization. Therefore, the firms use the stochastic discount factor of the skilled household in their dynamic profit maximization problem. For long-run analysis, as we will assume that the marginal utility is equated across households (only) in steady-state, it is irrelevant which stochastic discount factor is used by the firms.

[5] We introduce government spending in the model for a realistic calibration. As we discuss later, the government spending-to-GDP ratio is kept fixed throughout in the model.

where ρ_1^R and ρ_2^R govern interest rate smoothing, $\phi_\pi \geq 0$ is the feedback parameter on inflation, Y_t^n is the natural (that is, flexible price) level of output, $\phi_{\Delta y}$ is the feedback parameter on output growth, ϕ_x is the feedback parameter on output gap, and $\bar{R}$ is the steady-state value of R_t. For large enough feedback coefficients (a combination of ϕ_π, $\phi_{\Delta y}$, and ϕ_x), the Taylor principle is satisfied.[6] We will also consider a case, described in detail next, where the Taylor principle is not satisfied, and inflation response will play a direct role in government debt stabilization.

2.3.3. Fiscal policy. We consider a one-time permanent change in the capital tax rate τ_t^K in period 0, when the economy is in the initial steady-state. In order to isolate the effects of the capital tax rate cut, $\frac{G_t}{Y_t}$ is kept unchanged from its initial steady-state value in all periods. The debt-to-GDP ratio, $\frac{B_t}{P_t Y_t}$, may deviate from the initial steady-state in the short-run but will converge back to the initial steady-state in the long-run, through appropriate changes in fiscal instruments. We organize the policy experiments in two layers. The long-run analysis considers three fiscal financing schemes: transfer adjustment, labor tax adjustment, and consumption tax adjustment. The transition and welfare analysis then adds temporary monetary accommodation as a second dimension for the two distortionary tax-financing cases, yielding five main cases: transfer adjustment, labor tax adjustment, consumption tax adjustment, labor tax adjustment with temporary monetary accommodation, and consumption tax adjustment with temporary monetary accommodation.

We describe the three fiscal rules next. First, only lump-sum transfers adjust following a rule similar to the monetary policy rule specification in Coibion and Gorodnichenko (2011),

$$\begin{aligned}\frac{S_t}{Y_t} - \frac{\bar{S}_{new}}{\bar{Y}_{new}} =& \rho_1^S \left(\frac{S_{t-1}}{Y_{t-1}} - \frac{\bar{S}_{new}}{\bar{Y}_{new}} \right) + \rho_2^S \left(\frac{S_{t-2}}{Y_{t-2}} - \frac{\bar{S}_{new}}{\bar{Y}_{new}} \right) \\ &+ \left(1 - \rho_1^S - \rho_2^S\right) \left\{ \psi_B^S \left(\frac{B_{t-1}}{P_{t-1} Y_{t-1}} - \overline{\frac{B}{PY}} \right) + \psi_{\Delta y}^S \left(\frac{Y_t}{Y_{t-1}} \right) + \psi_x^S \left(\frac{Y_t}{Y_t^n} \right) \right\},\end{aligned}$$

where $0 \leq \rho_1^S + \rho_2^S < 1$ governs transfer smoothing, $\psi_B^S \geq 0$ is the feedback parameter on outstanding debt, $\psi_{\Delta y}^S$ is the feedback parameter on output growth, ψ_x^S is the feedback parameter on the output gap, $\bar{S}_{new}$ is the new steady-state value of S_t, and $\overline{\frac{B}{PY}}$ is the steady-state value of $\frac{B_t}{P_t Y_t}$. A large enough feedback coefficient on debt (high ψ_B^S) ensures stationary debt dynamics.

Second, distortionary tax rates—either the labor tax rate (τ_t^H) or the consumption tax rate

[6] In the textbook linearized sticky price model, this condition is $\phi_\pi > 1$. In the model here, as there are several endogenous propagation mechanisms and an empirically grounded interest rate rule, such a condition has to be determined numerically, although $\phi_\pi > 1$ is often a good benchmark.

(τ_t^C)—adjust following a feedback rule similar to the monetary policy rule specification:[7]

$$\begin{aligned}\tau_t^j - \bar{\tau}_{new}^j =& \rho_1^j\left(\tau_{t-1}^j - \bar{\tau}_{new}^j\right) + \rho_2^j\left(\tau_{t-2}^j - \bar{\tau}_{new}^j\right) \\ &+ \left(1-\rho_1^j-\rho_2^j\right)\left\{\psi_B^j\left(\frac{B_{t-1}}{P_{t-1}Y_{t-1}} - \overline{\frac{B}{PY}}\right) + \psi_{\Delta y}^j\left(\frac{Y_t}{Y_{t-1}}\right) + \psi_x^j\left(\frac{Y_t}{Y_t^n}\right)\right\}, \quad j \in \{H, C\},\end{aligned} \tag{2.3}$$

where $0 \leq \rho_1^j + \rho_2^j < 1$ governs tax rate smoothing, $\psi_B^j \geq 0$ is the feedback parameter on outstanding debt, $\psi_{\Delta y}^j$ is the feedback parameter on output growth, ψ_x^j is the feedback parameter on the output gap, and $\bar{\tau}_{new}^j$ is the new steady-state value of τ_t^j.[8] A large enough feedback coefficient on debt (high ψ_B^j) ensures that fiscal policy leads to stationary debt dynamics.[9]

For transition dynamics, the behavior of the monetary authority generally matters. In the three fiscal policies described above, the monetary policy rule, Equation (2.2), satisfies the Taylor principle, which implies that inflation does not play a direct role in stabilizing the government debt. Moreover, given our restrictions that ψ_B^S, ψ_B^H and ψ_B^C are high enough, taxes respond strongly enough to ensure that debt dynamics are mean-reverting. By stabilizing the debt-to-GDP ratio—returning it to its initial steady-state level along the transition path—these feedback rules ensure that the government's intertemporal budget constraint is satisfied.

Finally, to highlight the role of monetary policy in transition dynamics, we also consider the monetary accommodation of fiscal expansion through the funded/unfunded decomposition of Bianchi et al. (2023). We refer to this approach as the Bianchi-Faccini-Melosi (BFM) decomposition below. It introduces a shadow economy operating under a passive monetary/active fiscal (PMAF) regime—one in which the central bank does not raise interest rates enough to fully offset the tax cut's inflationary pressure (passive monetary policy), so that this inflation itself helps stabilize the real value of government debt in place of future tax adjustments (active fiscal policy), allowing the central bank to temporarily accommodate fiscal inflation while remaining active in the long run. We apply this temporary accommodation to both labor-tax and consumption-tax

[7] The United States does not currently levy a broad-based federal consumption tax (such as a VAT). Our calibration implies an effective consumption tax rate of only 1.9%, reflecting mostly state and local sales taxes and federal excise duties. The consumption tax adjustment scenario is therefore partly counterfactual but policy-relevant, as it illustrates the welfare properties of a less distortionary revenue instrument. See, for example, ongoing U.S. policy debates on a national sales tax or carbon tax.

[8] Feedback rules for fiscal policy were estimated in an early contribution by Bohn (1998). Bhattarai, Lee and Park (2016) estimate slightly simpler versions than above in a general equilibrium model with lump-sum taxes. Note importantly that in Equation (2.3), distortionary tax rates adjust smoothly during the transition.

[9] In the textbook linearized model with one source of taxes, this condition is $\psi_B^j > \beta^{-1} - 1$. In the model here, we solve for non-linear dynamics and additionally, as there are several sources of taxes and an empirically grounded tax rule, such a condition has to be determined numerically.

financing. We describe the BFM framework in detail in Section 4.[10]

2.4. Equilibrium

The equilibrium definition is standard, given the maximization problems of the private sector and the monetary and fiscal policy rules described above. Goods, asset, and factor markets clear in equilibrium. The economy features balanced growth. A balanced growth path is an equilibrium in which real per-capita variables grow at constant rates, with labor hours stationary. As we describe below, we use standard assumptions on preferences that ensure balanced growth. Moreover, since our production function features two types of capital and capital-skill complementarity, we impose an additional assumption on the growth rate of q_t, the exogenous relative price between investment in capital structures and equipment.

Generally, we normalize variables that grow along the balanced growth path so that they become stationary (detailed formulas are in Appendix A.1). Fiscal variables, as mentioned above, are normalized by output. We use the notation, for instance, $\tilde{Y}_t \equiv \frac{Y_t}{\gamma^t}$ and $\tilde{b}_t \equiv \frac{B_t}{P_t Y_t}$ to denote these stationary variables, where γ is the growth rate of output. We also use the notation T_t^C, T_t^H, and T_t^K to denote (real) consumption, labor, and capital tax revenues. Nominal variables are denoted in real terms in small case letters, for example, $w_t = \frac{W_t}{P_t}$. All the equilibrium conditions are derived in detail in the Appendix A.1.

2.5. Functional forms and balanced growth

We use the following functional forms for preferences and technology

$$U(C_t^i, H_t^i) \equiv \log C_t^i - \bar{\omega}^i \frac{\left(H_t^i\right)^{1+\varphi}}{1+\varphi},$$

$$F\left(A_t, K_{b,t}, K_{e,t}, L_{s,t}, L_{u,t}\right) \equiv A_t \left(K_{b,t}\right)^{\alpha} \left[\mu L_{u,t}^{\sigma} + \left(1-\mu\right)\left(\lambda\left(K_{e,t}\right)^{\rho} + (1-\lambda)\left(L_{s,t}\right)^{\rho}\right)^{\frac{\sigma}{\rho}}\right]^{\frac{1-\alpha}{\sigma}},$$

and for the investment adjustment and variable capacity utilization costs

$$\mathscr{S}\left(\frac{I_t}{I_{t-1}}\right) \equiv \frac{\xi}{2}\left(\frac{I_t}{I_{t-1}} - \gamma\right)^2, \quad \mathscr{A}\left(u_t\right) \equiv \chi_1\left(u_t - 1\right) + \frac{\chi_2^2}{2}\left(u_t - 1\right)^2.$$

The utility function is standard and consistent with balanced growth. The production function $F(\cdot)$ is a nested CES structure used in Krusell et al. (2000). This implies that equipment capital and skilled labor have the same elasticity of substitution against unskilled labor, given by

[10] For completeness, we also examine a permanent PMAF regime in Appendix E. While we consider these various fiscal/monetary adjustment scenarios to investigate how both positive and normative results depend on policy choices, our analysis is not in the Ramsey policy tradition.

$1/(1-\sigma)$. The elasticity of substitution between equipment capital and skilled labor is $1/(1-\rho)$. Capital-skill complementarity exists when $\sigma>\rho$. The parameters μ and λ govern income shares. Note that when $\rho \to 0$, the production function reduces to a standard Cobb-Douglas formulation, which we will use for analytical results. Suppose that the gross growth rate of A_t is $\bar{a} = \gamma^{1-\alpha}$. We then assume that the exogenous relative price between consumption (structures) and equipment investment, q_t, grows at a rate $\gamma_q = 1/\gamma$, which leads to balanced growth in the model. It follows that all growing variables except A_t and equipment capital grow at a rate γ.[11]

3 Long-run results

This section presents our results on the long-run effects of changes in the capital tax rate. Our key focus is on the source of financing the capital tax rate cut. We consider the three different fiscal policy adjustments presented above in Section 2.3.3, all of which ensure that the government debt-to-GDP ratio is at the same level in the long-run. The first is by (non-distortionary) transfer adjustment, which we take as the starting point. We then look at how a distortionary adjustment of labor tax rate and consumption tax rate alters the results.

3.1. Analytical results of a simplified model

We start with analytical results that help clarify the mechanisms regarding the long-run aggregate effects under different fiscal financing options. The purpose of the simplified model is deliberately narrow: it isolates the labor-supply and the tax base channels through which financing choices rank aggregate outcomes. For this, we simplify our model so that it converges to a textbook business cycle model. In particular, we first assume $\rho \to 0$ to obtain a nested version of the model with a Cobb-Douglas production function. It is also assumed that the two share parameters are zero, $\mu = \alpha = 0$, and that the fraction of skilled households is 1, $N^S = 1$. In this case, the model now has one type of capital $K_{e,t}$ and one type of labor $L_{s,t}$ and a standard Cobb-Douglas production function that implies a unit elasticity of substitution between capital and labor. In the analytical results below, we drop the subscripts e and s for the variables. For simplicity, there is no expensing of the tax rate.

The mechanism for the aggregate effects of a capital tax rate cut when non-distortionary transfers adjust in such a textbook model is well-understood. A reduction in the capital tax

[11] Balanced growth with capital-skill complementarity in the production function was shown in Maliar and Maliar (2011), who pointed out the need to have an exogenous path for relative price between consumption (structures) and equipment and restrictions on the growth rate.

rate leads to a decrease in the rental rate of capital, raising firms' demand for capital. This stimulates investment and, as a result, the capital-to-labor ratio increases. A larger amount of capital stock, in turn, makes workers more productive, raising wages and hours. Given the increase in the factors of production, output increases, which also raises consumption unless the steady-state ratio of government spending-to-GDP is unrealistically very high.[12] Once transfers no longer absorb the revenue loss, the same capital accumulation force remains, but the required tax increase changes households' intratemporal labor-supply condition. The proposition below shows that the ranking across financing schemes is therefore a ranking of labor-supply distortions.

Proposition 1. *Let* $\bar{\tau}^K_{new} = \bar{\tau}^K + \Delta\left(\bar{\tau}^K\right)$ *denote a new capital tax rate with a small change* $\Delta\left(\bar{\tau}^K\right)$. *Also, denote the new labor and consumption tax rate required to finance the capital tax rate change by* $\bar{\tau}^H_{new} = \bar{\tau}^H + \Delta\left(\bar{\tau}^H\right)$ *and* $\bar{\tau}^C_{new} = \bar{\tau}^C + \Delta\left(\bar{\tau}^C\right)$, *respectively, with respective changes* $\Delta\left(\bar{\tau}^H\right)$ *and* $\Delta\left(\bar{\tau}^C\right)$. *The new steady-state values of a variable* $\bar{X}_{new}$ *in transfer adjustment case, in labor tax rate adjustment case, and in consumption tax rate adjustment case are denoted by* $\bar{X}^T_{new}$, $\bar{X}^L_{new}$ *and* $\bar{X}^C_{new}$, *respectively. For* $X \in \{\tilde{C}, \tilde{K}, \tilde{I}, \tilde{Y}, H\}$,

$$\ln\left(\frac{\bar{X}^T_{new}}{\bar{X}^L_{new}}\right) = -\Theta^T_L \Delta\left(\bar{\tau}^K\right) = \frac{1}{1+\varphi}\left(\frac{1}{1-\bar{\tau}^H}\right)\Delta\left(\bar{\tau}^H\right),$$

where $\Theta^T_L = \frac{1}{1+\varphi}\left(\frac{1}{1-\bar{\tau}^H}\right)\frac{\lambda}{1-\lambda}\left(1+\frac{\bar{a}-(1-d)}{\frac{\bar{a}}{\beta}-(1-d)}\bar{\tau}^C\right) > 0$, *and*

$$\ln\left(\frac{\bar{X}^T_{new}}{\bar{X}^C_{new}}\right) = -\Theta^T_C \Delta\left(\bar{\tau}^K\right) = \frac{1}{1+\varphi}\left(\frac{1}{1+\bar{\tau}^C}\right)\Delta\left(\bar{\tau}^C\right),$$

where $\Theta^T_C > 0$ *if* $\bar{\tilde{G}} < 1 - \lambda\frac{\theta-1}{\theta}\frac{\bar{a}-(1-d)}{\frac{\bar{a}}{\beta}-(1-d)}\left(1-\bar{\tau}^K_{new}\right)$. *Moreover,*

$$\ln\left(\frac{\bar{X}^L_{new}}{\bar{X}^C_{new}}\right) = \Theta^L_C \Delta\left(\bar{\tau}^K\right) = \frac{1}{1+\varphi}\left(\left(\frac{1}{1+\bar{\tau}^C}\right)\Delta\left(\bar{\tau}^C\right) - \left(\frac{1}{1-\bar{\tau}^H}\right)\Delta\left(\bar{\tau}^H\right)\right),$$

where $\Theta^L_C > 0$ *if* $\bar{\tilde{G}} < 1 - \lambda\frac{\theta-1}{\theta}\frac{\bar{a}-(1-d)}{\frac{\bar{a}}{\beta}-(1-d)}\left(1-\bar{\tau}^K_{new}\right) - (1-\lambda)\frac{\theta-1}{\theta}\frac{1-\bar{\tau}^H}{1+\bar{\tau}^C}$. *It follows that under the mild condition on government spending, for a small change* $\Delta\left(\bar{\tau}^K\right) < 0$,

$$\bar{X}^L_{new} < \bar{X}^C_{new} < \bar{X}^T_{new}.$$

Proof. See Appendix B.5. ∎

Proposition 1 implies that when the capital tax rate is cut, output, capital, investment, consumption, and hours increase by more in the transfer adjustment case than in either the labor

[12] In such a case, government consumption or investment crowds out private consumption; see Appendix B.3, Proposition B.1 for details, which formally presents the results discussed above.

tax rate adjustment case or the consumption tax adjustment case. Moreover, the consumption tax rate adjustment leads to bigger expansionary effects than the labor tax rate adjustment.

Compared to the case of lump-sum transfer adjustment, the aggregate effects are smaller because of distortions created by the labor or consumption tax rate increases that affect labor supply negatively. Moreover, the differences in the changes in output, investment, consumption, and hours across the three financing options are given by the same amount. This constant difference depends intuitively on the labor supply parameter for a given change in the tax rates: A higher Frisch elasticity ($\frac{1}{\varphi}$) makes workers more responsive to labor tax rates or consumption tax rates, thereby generating greater distortions, which in turn, magnifies the difference, while the three fiscal adjustments produce the same outcomes when labor supply is completely inelastic ($\frac{1}{\varphi}=0$). Moreover, the higher the initial labor tax rate, the larger is the difference.

When it comes to comparing the labor tax rate to the consumption tax rate adjustment, the latter is less distortionary for labor hours, thereby generating bigger aggregate effects. The mechanism is easiest to see by separating two objects. First, the residual tax instrument changes the intratemporal labor-supply wedge by $d\bar{\tau}^H/(1-\bar{\tau}^H)$ under labor-tax financing and by $d\bar{\tau}^C/(1+\bar{\tau}^C)$ under consumption-tax financing. Second, the size of the required statutory tax increase depends on the tax base that absorbs the revenue loss. Together, these two forces imply that the relevant comparison is between effective tax bases, not statutory tax bases alone.

To make these statements precise, start from the steady-state intratemporal condition,

$$\frac{1-\bar{\tau}^H}{1+\bar{\tau}^C}\,\bar{\tilde{w}}=\bar{\omega}\bar{\tilde{C}}\bar{H}^{\varphi}\quad\Longleftrightarrow\quad\bar{H}=\left(\bar{\omega}\mathscr{W}\right)^{-1/(1+\varphi)},\qquad\mathscr{W}\equiv\frac{\left(1+\bar{\tau}^C\right)\bar{\tilde{C}}}{\left(1-\bar{\tau}^H\right)\bar{\tilde{w}}\bar{H}}.$$

The production block pins down $\bar{\tilde{C}}/\bar{H}$ and $\bar{\tilde{w}}$ as functions of $\bar{\tau}^K$ alone, independent of the financing instrument, so $\mathscr{W}$ acts as the relevant labor-supply wedge for ranking financing schemes. From the resource constraint and factor shares,

$$D_K\equiv\frac{\bar{\tilde{C}}}{\bar{\tilde{Y}}}=1-\bar{\tilde{G}}-\lambda\bar{mc}\mathscr{A}_K\left(1-\bar{\tau}^K\right),\qquad\mathscr{A}_K\equiv\frac{\bar{a}-(1-d)}{\frac{\bar{a}}{\bar{\beta}}-(1-d)},\qquad\frac{\bar{\tilde{C}}/\bar{H}}{\bar{\tilde{w}}}=\frac{D_K}{(1-\lambda)\,\bar{mc}},$$

where $\bar{mc}\equiv\frac{\theta-1}{\theta}$. D_K depends only on $\bar{\tau}^K$, not on the residual fiscal instrument: it captures the change in the capital-output and investment-output ratios induced by the capital tax cut, common to both financing schemes. Total differentiation of $\ln\mathscr{W}$ gives

$$d\ln\mathscr{W}^C=d\ln D_K+\frac{d\bar{\tau}^C}{1+\bar{\tau}^C},\qquad d\ln\mathscr{W}^L=d\ln D_K+\frac{d\bar{\tau}^H}{1-\bar{\tau}^H},$$

so when the two financing schemes are compared, the common $d\ln D_K$ drops out and only the

normalized statutory changes $d\bar{\tau}^C/(1+\bar{\tau}^C)$ and $d\bar{\tau}^H/(1-\bar{\tau}^H)$ remain.

The government budget constraint pins down each. With long-run debt and transfers fixed,

$$\bar{\tau}^C D_K + \bar{\tau}^H (1-\lambda)\,\bar{mc} + \bar{\tau}^K \lambda \bar{mc} = \bar{\bar{S}} + \bar{\bar{G}} + \left(\frac{1}{\beta} - 1\right)\bar{\bar{b}},$$

and using $dD_K = \lambda \bar{mc} \mathscr{A}_K d\bar{\tau}^K$, the normalized tax differentials required under the two financing schemes can be written as

$$\frac{d\bar{\tau}^C}{1+\bar{\tau}^C} \simeq -\frac{\lambda \bar{mc}\left(1+\mathscr{A}_K \bar{\tau}^C\right)}{\mathscr{B}_C} d\bar{\tau}^K, \quad \frac{d\bar{\tau}^H}{1-\bar{\tau}^H} \simeq -\frac{\lambda \bar{mc}\left(1+\mathscr{A}_K \bar{\tau}^C\right)}{\mathscr{B}_H} d\bar{\tau}^K, \tag{3.1}$$

with the effective tax bases $\mathscr{B}_C \equiv \left(1+\bar{\tau}^C\right) D_K$ and $\mathscr{B}_H \equiv \left(1-\bar{\tau}^H\right)(1-\lambda)\,\bar{mc}$.

Each effective base is the natural statutory base in GDP units—consumption expenditure $\bar{\bar{C}}/\bar{\bar{Y}}$ for the consumption tax and labor income $(1-\lambda)\,\bar{mc}$ for the labor tax—scaled by the corresponding wedge factor. Equation (3.1) shows the comparison directly. After a capital tax cut, $d\bar{\tau}^K < 0$, both required normalized tax increases are positive; they share the same revenue-need numerator and differ only by the effective base in the denominator. The instrument with the larger effective base therefore requires the smaller wedge increase, so consumption-tax financing is less distortionary whenever

$$\mathscr{B}_C > \mathscr{B}_H \quad \Longleftrightarrow \quad \left(1+\bar{\tau}^C\right) D_K > \left(1-\bar{\tau}^H\right)(1-\lambda)\,\bar{mc}, \tag{3.2}$$

which is the government-spending condition stated in Proposition 1. This condition has a transparent "broad base, low rate" intuition, in the spirit of studies that find consumption taxation less distortionary than income or labor taxation (Coleman, 2000, Altig et al., 2001): the less distortionary instrument is the one whose effective base is larger. The two bases respond asymmetrically to the composition of output. The labor-tax base $(1-\lambda)\bar{mc}$ is pinned down by production technology and is independent of fiscal aggregates, while the consumption-tax base $D_K = 1 - \bar{\bar{G}} - \lambda \bar{mc} \mathscr{A}_K (1-\bar{\tau}^K)$ is constrained by the resource constraint and shrinks one-for-one with government spending. The comparison thus depends on how output is allocated among private consumption, investment, and government purchases. Mapping this wedge comparison into hours, the log-linearized intratemporal condition gives

$$\ln\left(\frac{\bar{H}^L_{new}}{\bar{H}^C_{new}}\right) = \frac{1}{1+\varphi}\left(\frac{d\bar{\tau}^C}{1+\bar{\tau}^C} - \frac{d\bar{\tau}^H}{1-\bar{\tau}^H}\right) = \Theta^L_C d\bar{\tau}^K.$$

Under the stated condition (3.2), the term in parentheses is negative because the labor-tax wedge increases more than the consumption-tax wedge. Since the capital-to-hours, output-to-hours, investment-to-hours, and consumption-to-hours ratios are common to the two financing

schemes, the same ranking carries over to output, capital, investment, and consumption.

This condition (3.2) also clarifies why initial tax rates matter in the calibration: $\bar{\tau}^H \approx 0.23$ pushes $1-\bar{\tau}^H$ well below one and amplifies any labor-tax wedge increase, whereas the small initial $\bar{\tau}^C$ leaves $1+\bar{\tau}^C$ close to one. The relative tax bases also matter, but in the calibration they are similar in magnitude, so the wedge-factor channel dominates.[13] Appendix B.5 proves the general comparison. This finding plays a critical role in the welfare analysis of Section 5.

3.2. Numerical results of the quantitative model

The preceding analytical results provide sharp qualitative predictions—the ranking of financing schemes and the role of the Frisch elasticity—but are derived under simplifying assumptions (Cobb-Douglas production, no capital-skill complementarity, no hand-to-mouth households). We now turn to the full quantitative model to assess whether these insights survive in a richer environment with CES production, two capital types, and heterogeneous households. We first describe the calibration and model fit and then present the numerical long-run effects.

3.2.1. Calibration and model fit. We calibrate the model at a quarterly frequency to match the U.S. economy over 2015Q1–2017Q4, the pre-TCJA period. Table 1 summarizes the parameterization.

We use separable preferences that imply log utility in consumption and a Frisch elasticity of labor supply of $1/\varphi = 2$ (baseline; sensitivity at $1/\varphi \in \{1,4\}$). The discount factor $\beta = 0.9975$ implies a steady-state annualized real interest rate of approximately 3.2%. For the production function, we use the updated capital-skill complementarity elasticity estimates of Ohanian et al. (2023): $\sigma = 0.432$ and $\rho = -0.316$, which are estimated using an extended sample and refined methodology relative to the original Krusell et al. (2000) estimates. Quarterly depreciation rates are computed from the Bureau of Economic Analysis (BEA) Fixed Asset Tables as the ratio of consumption of fixed capital (CFC) to the current-cost net stock, averaged over 2015–2017: $d_e = 0.036$ for equipment (13.6% annual) and $d_b = 0.0078$ for structures (3.1% annual).

We define a model-consistent output measure $Y_{\text{adj}} \equiv C + I_e + I_b + G$, where model G corresponds to government consumption expenditures. Over 2015Q1–2017Q4, $Y_{\text{adj}}/\text{GDP} = 0.90$, and

[13] Using the calibrated values of the next subsection (Table 1) to gauge magnitudes, $\bar{\tau}^H \approx 0.232$ and $\bar{\tau}^C \approx 0.019$, while the consumption share of Y_{adj} is $\bar{\tilde{C}}/\bar{\tilde{Y}} \approx 0.744$ and the labor-income share is 0.616. The two effective bases are therefore $\mathscr{B}_C \approx (1.019)(0.744) \approx 0.76$ and $\mathscr{B}_H \approx (0.768)(0.616) \approx 0.47$, so the consumption-tax wedge increases by roughly $\mathscr{B}_H/\mathscr{B}_C \approx 0.62$ as much as the labor-tax wedge per unit of capital tax revenue lost. Of this gap, the wedge-factor ratio $(1-\bar{\tau}^H)/(1+\bar{\tau}^C) \approx 0.75$ contributes more than the base ratio $0.616/0.744 \approx 0.83$. More broadly, this U.S. comparison reflects a modest government-consumption share ($\bar{\tilde{G}} \approx 0.16$); the broad-base condition would tighten—and could in principle reverse—in economies with substantially larger public sectors.

Table 1: Calibration for long-run analysis

	Value	Description	Source / Target
Panel A: Households			
β	0.9975	Time preference	SS annual real rate $\approx$ 3.2%
φ	0.5	Inverse of Frisch elasticity of labor supply	Frisch elasticity=2
$\bar{\omega}^s$	2.69	Labor supply disutility for skilled households	$\bar{H}^s = 0.33$; RBC convention
$\bar{\omega}^u$	5.22	Labor supply disutility for unskilled households	$\bar{H}^s/\bar{H}^u = 1.07$, BLS CPS
N^s	0.41	Fraction of skilled labor (BA+, full-time workers 25+)	BLS CPS, 2015–2017
d_e	0.036	Equipment capital depreciation (quarterly)	BEA Fixed Asset Tables CFC/K, 2015–2017
d_b	0.0078	Structures capital depreciation (quarterly)	BEA Fixed Asset Tables CFC/K, 2015–2017
Panel B: Firms			
σ	0.432	Elasticity of substitution between unskilled and equipment	Ohanian, Orak and Shen (2023)
ρ	-0.316	Elasticity of substitution between skilled and equipment	Ohanian et al. (2023)
α	0.073	Structures capital income share	Target: I_b/Y_{adj}
λ	0.272	Equipment capital income share	Target: labor share
μ	0.384	Unskilled labor income share	Target: skill premium
γ	1.0054	Long-run growth rate of output	Avg. quarterly real GDP growth
$\bar{\pi}$	1.0050	Steady-state inflation rate	Fed 2% annual target
θ	4.0	Elasticity of substitution between goods	SS markup: 33%
q_0	1.85	Relative price of structure to equipment capital	Target: I_e/Y_{adj}
Panel C: Government			
$\bar{\tilde{b}}$	0.829	Steady-state debt to Y_{adj} ratio	FRED, 2015–2017
$\bar{\tilde{G}}$	0.155	Steady-state government consumption to Y_{adj} ratio	NIPA A955, 2015–2017
$\bar{\tilde{T}}^C$	0.0138	Steady-state consumption tax revenue to Y_{adj} ratio	MRT method, 2015–2017
$\bar{\tilde{T}}^H$	0.143	Steady-state labor tax revenue to Y_{adj} ratio	MRT method, 2015–2017
χ^s_Φ	1	Fraction of profit distribution to skilled worker	Assigned
χ^s_S	0	Fraction of transfer to skilled worker	Assigned
λ_b	0.338	Effective expensing rate of structure investment	Barro and Furman (2018)
λ_e	0.812	Effective expensing rate of equipment investment	Barro and Furman (2018)

Notes: CFC/K = consumption of fixed capital divided by the net capital stock, used to compute quarterly depreciation rates from BEA Fixed Asset Tables. $Y_{\text{adj}} \equiv C + I_e + I_b + G$ is the model-consistent output measure, where G is government consumption expenditures. We follow Mendoza et al. (1994) (MRT) in attributing one-half of proprietors' income to labor: the labor share is (COE + $\frac{1}{2}$PRI)/Y_{adj}, and the same convention is used to construct effective tax rates from tax revenue data at all levels of government (federal, state, and local). All fiscal ratios are expressed relative to Y_{adj}. Parameters α, λ, μ, and q_0 are calibrated to match the structures investment share (I_b/Y_{adj}), labor share, skill premium, and equipment investment share (I_e/Y_{adj}), respectively.

all steady-state ratios are expressed relative to Y_{adj}. The structures capital income share $\alpha = 0.073$ is set analytically to match the structures investment-to-output ratio $I_b/Y_{\text{adj}} = 3.4\%$ from NIPA data. The remaining three production function parameters—equipment capital income share $\lambda = 0.272$, unskilled labor share $\mu = 0.384$, and relative price of equipment $q_0 = 1.85$—are jointly calibrated to match three moments: an aggregate labor share of 62.5%, a skill premium of 82.1%,

and an equipment investment-to-output ratio $I_e / Y_{\text{adj}} = 6.7\%$. The labor share is computed from NIPA data as (compensation of employees plus one-half of proprietors' income) divided by Y_{adj}, averaged over 2015Q1–2017Q4, applying the same one-half attribution of proprietors' income to labor that we use below when constructing effective tax rates via the Mendoza et al. (1994) (MRT) method. The skill premium—defined as the ratio of the median weekly earnings of BA+ workers to that of workers without a bachelor's degree—is the 2015–2017 average from the BLS CPS usual weekly earnings data (full-time wage and salary workers aged 25 and over).

We use the Bureau of Labor Statistics' Current Population Survey (CPS) data on usual weekly earnings of full-time wage and salary workers aged 25 and over to calculate both the fraction of skilled households and the skill premium. We define skilled workers as those with a bachelor's degree or more, following the convention in the literature (*e.g.,* Autor, 2014). The share of BA+ workers among full-time workers 25+ averaged 41% over 2015–2017, which we set as $N^s = 0.41$, and the skill premium—defined as the ratio of the median weekly earnings of BA+ workers to that of workers without a bachelor's degree—averages 82% over the same period. Both N^s and the skill premium are computed from the same BLS CPS data source, ensuring internal consistency.

Additionally, across various fiscal adjustment scenarios and preference and technology specifications, we normalize hours for skilled labor to be 0.330 and hours for unskilled labor to be 0.308 in the initial steady-state by appropriately adjusting the scaling parameters $\bar{\omega}^s$ and $\bar{\omega}^u$. The normalization $\bar{H}^s = 0.33$ corresponds to the standard RBC convention of one-third of discretionary time devoted to market work. The ratio $\bar{H}^s / \bar{H}^u = 1.07$ is consistent with data from the CPS Merged Outgoing Rotation Group (MORG) files: over 2015–2017, workers with a BA or higher averaged approximately 40.5 usual weekly hours, compared to approximately 38 hours for workers with a high school diploma, yielding a ratio of 1.07.

The steady state of the fiscal variables—debt, government spending, and tax revenues—is matched to their respective long-run values in the data, expressed as ratios to Y_{adj}. Appendix C describes this data in detail. For tax rates, we follow the methodology of Mendoza et al. (1994) (MRT), computed at all levels of government (federal, state, and local), to obtain effective tax revenue-to-Y_{adj} ratios for consumption and labor taxes. We then calibrate the steady-state markup to obtain a 35% capital tax rate initially. For the effective expensing rates of the two types of capital, we use the estimates in Barro and Furman (2018), which imply lower expensing of structure investment. We assume that the profit shares for skilled labor ,χ^s_Φ, is 1 and the transfer share for unskilled labor, χ^u_S, is 1. This baseline assigns firm profits and government bond hold-

Table 2: Targeted and untargeted moments

Moment	Data	Model
Panel A: Targeted moments		
Labor share of income	0.625	0.616
Skill premium (w_s/w_u)	1.821	1.821
Equipment investment / Y_{adj}	0.067	0.067
Structures investment / Y_{adj}	0.034	0.034
Debt / Y_{adj}	0.829	0.829
Gov consumption / Y_{adj}	0.155	0.155
Cons tax revenue / Y_{adj}	0.0138	0.0138
Labor tax revenue / Y_{adj}	0.143	0.143
Statutory capital tax rate	0.350	0.350
Panel B: Untargeted moments		
Consumption / Y_{adj}	0.745	0.744
Effective labor tax rate (MRT)	24.4%	23.2%
Effective consumption tax rate (MRT)	1.9%	1.9%

Notes: BLS CPS usual weekly earnings data (full-time workers 25+, 2015–2017 averages) for skill premium and fraction skilled; BLS CPS MORG for hours ratio; FRED/NIPA for fiscal ratios and investment shares; BEA Fixed Asset Tables (2015–2017 CFC/K) for depreciation rates. The labor share ((COE + $\frac{1}{2}$PRI)/Y_{adj}), effective tax rates, and tax revenue shares all use the Mendoza et al. (1994) (MRT) method, which attributes one-half of proprietors' income to labor. $Y_{\text{adj}} \equiv C + I_e + I_b + G$, with G as government consumption expenditures (see Appendix C).

ings to the Ricardian skilled household and transfers to the hand-to-mouth unskilled household. It is a transparent benchmark in which capital income and fiscal transfers map to opposite sides of the household distribution, but it is not innocuous for distributional magnitudes. Section 7 and Appendix E therefore report alternative profit and transfer assignment assumptions.

Table 2 summarizes the model fit. Panel A lists the ten targeted moments. The skill premium, equipment and structures investment shares, and fiscal ratios are matched essentially exactly. The labor share has a small residual gap (model: 0.616 vs. data: 0.625) reflecting a binding structural tradeoff among the three jointly targeted moments. Panel B shows that the model closely matches the consumption-to-Y_{adj} ratio (0.744 vs. 0.745 in the data), the effective consumption tax rate (1.9%), and the effective labor tax rate (23.2% vs. 24.4% in the MRT data).[14] We present a detailed sensitivity analysis of our baseline parameterization in Section 7.

3.2.2. Long-run effects. The results for long-run effects under various financing policies are shown in Figure 1. While our focus is on a reduction of the capital tax rate from 35% to 21%,

[14] Our labor tax rate is lower than the 27% in Domeij and Heathcote (2004) and 28% in Trabandt and Uhlig (2011), reflecting differences in the tax base definition. We model capital taxation on gross return; Slavík and Yazici (2019) use a net-return formulation with $\tau^K = 39.65\%$ for structures. Our 35% on gross return is broadly consistent when accounting for depreciation allowances (λ_b, λ_e).

Table 3: Long-run effects of a permanent capital tax rate cut from 35% to 21%

	Transfer Adj.	Labor Tax Adj.	Cons. Tax Adj.
Output (Y)	2.87	1.15	1.68
Aggregate consumption (C)	1.88	0.13	0.63
Consumption: Skilled (c_s)	3.21	0.56	0.87
Consumption: Unskilled (c_u)	−1.26	−0.90	0.07
Equipment investment (I_e)	5.85	4.67	5.34
Structures investment (I_b)	18.66	16.68	17.28
Skilled wage (w_s)	3.08	2.38	2.22
Unskilled wage (w_u)	0.31	1.24	1.45
Skill premium (w_s/w_u, %)	2.77	1.12	0.76
Relative consumption (c_s/c_u, %)	4.53	1.47	0.80
New τ^H (%)	23.25	24.93	23.25
New τ^C (%)	1.85	1.85	3.27

Notes: Percentage changes from the initial steady state ($\tau^K = 0.35$) to the new steady state ($\tau^K = 0.21$).

which is highlighted by the colored dots in the Figure, we show the entire range of tax rate changes for completeness. Table 3 summarizes the main 35%-to-21% effects across the three financing schemes.

Under transfer adjustment (blue lines), the capital tax cut lowers total tax revenue, mainly through capital tax revenue. The reduction in tax revenues is then financed by a decline in the transfers-to-GDP ratio, as shown in the last panel of Figure 1.[15]

In terms of aggregate implications, for the 35%-to-21% cut, output rises 2.87%, structures investment 18.66%, and equipment investment 5.85%. The aggregate effects are driven by the same mechanism as in the simple model we discussed earlier, where the rental rate of capital falls, which leads to a boost in the capital-labor ratio and investment.

The distributional effects are less favorable. Skilled wages rise 3.08%, while unskilled wages rise only 0.31%, increasing the skill premium by 2.77%.[16] Income inequality, measured by the after-tax capital-to-labor income ratio, also unambiguously increases, although both types of income increase. These rises in wage and income inequality, coupled with the fall in transfers, which are all distributed to the unskilled in our baseline calibration, result in an increase in consumption inequality: unskilled consumption falls 1.26%, skilled consumption rises 3.21%, and relative consumption rises 4.53%. The resulting wealth effects reduce skilled hours slightly

[15]This result is not driven only by the denominator: total tax revenue also declines. Capital tax revenue falls by about 44% relative to the initial steady state, only partly offset by higher consumption and labor tax revenue. Capital tax Laffer peak occurs only at empirically irrelevant rates above 90% in our baseline calibration.

[16]Appendix B.2 derives analytically why the skill premium rises with the capital tax cut.

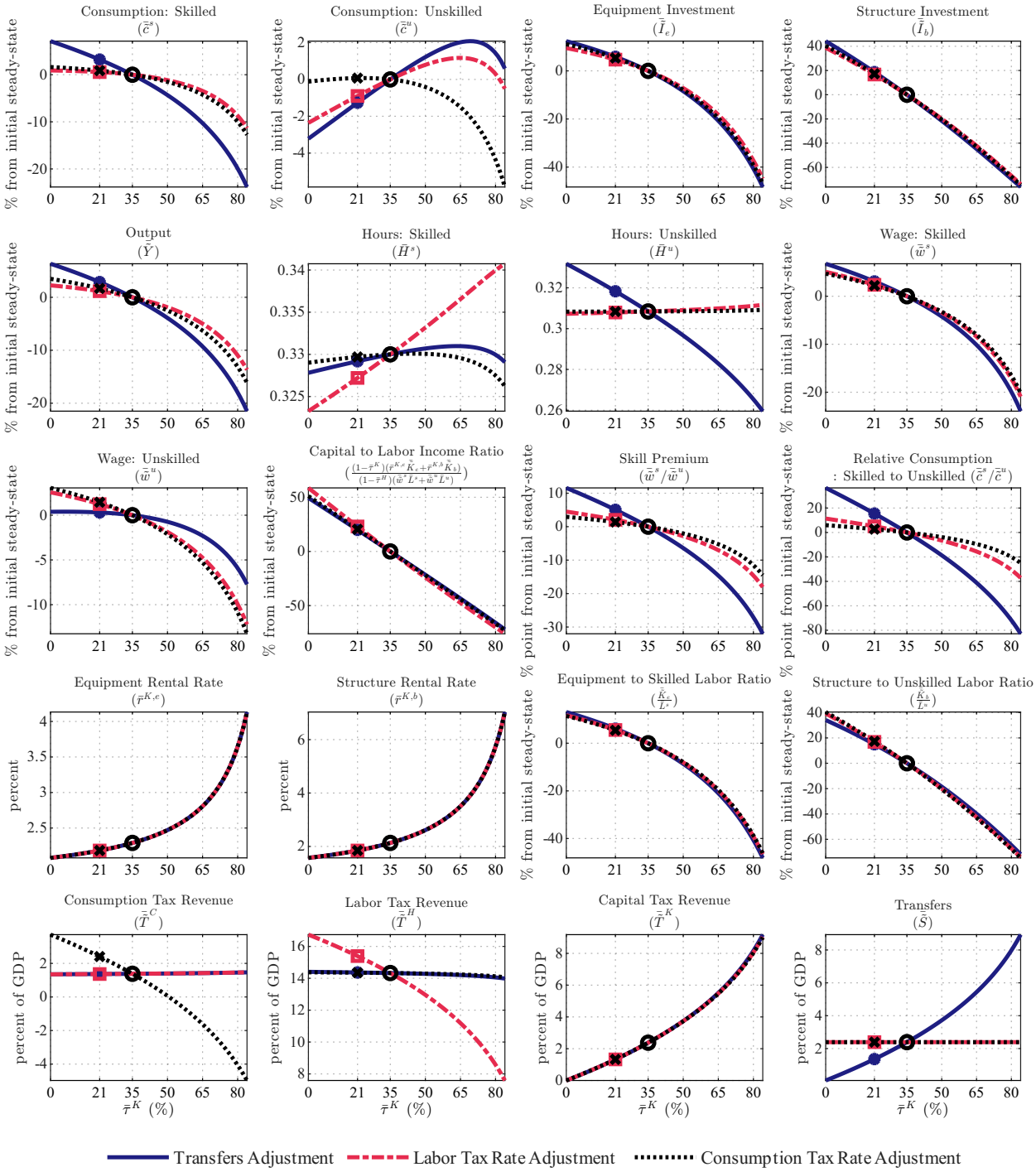


Figure 1: Long-run effects of permanent capital tax rate changes

Notes: Each panel plots a long-run outcome as a function of the new capital tax rate $\bar{\tau}^K$ on the horizontal axis (in percent). Colors distinguish the fiscal instrument that balances the government budget: transfer adjustment (blue solid), labor tax rate adjustment (red dash-dot), and consumption tax rate adjustment (black dotted). Open circles mark the initial steady state ($\bar{\tau}^K = 35\%$) and the filled markers the post-reform steady state ($\bar{\tau}^K = 21\%$).

and raise unskilled hours.[17] These increases in wage, income, and consumption inequality are caveats to the effectiveness of the tax cut, even when lump-sum transfers are allowed to finance the tax cut.

To understand the mechanisms behind these increases in inequality, we can express the skill premium in our model as

$$\frac{W_t^s}{W_t^u} = \frac{(1-\mu)(1-\lambda)}{\mu}\left(\lambda\left(\frac{K_{e,t}}{L_{s,t}}\right)^{\rho} + (1-\lambda)\right)^{\frac{\sigma-\rho}{\rho}}\left(\frac{L_{u,t}}{L_{s,t}}\right)^{1-\sigma}.$$

With capital-skill complementarity ($\sigma > \rho$), the skill premium rises with equipment capital when the two types of labor inputs are held fixed. This mechanism—which is operative even in a model with a representative household or perfect consumption insurance—drives our result on the skill premium. Household heterogeneity adds a second channel: higher consumption inequality changes labor supply, raising the unskilled-to-skilled labor ratio and reducing skilled hours, which further increases the equipment capital-to-skilled labor ratio and generates a further increase in wage inequality. The two sources of heterogeneity we introduce into an otherwise textbook macroeconomic model (skill heterogeneity and household heterogeneity) thus interact in economically meaningful ways to generate new distributional effects.

Because this distributional amplification depends partly on how profits and transfers are assigned across households, we treat these assignments as central robustness checks. The capital-skill-complementarity channel raises the skill premium across specifications, while the allocation of fiscal instruments mainly changes the size, and in some cases the sign, of consumption inequality responses. Section 7 presents these robustness checks, including the full set of alternative profit and transfer distributions.

We now contrast the results when the labor tax rate, instead of transfers, adjusts to finance the capital tax rate cut. Under labor tax adjustment (red lines), the labor tax rate rises from 23.2% to 24.9%. The capital tax cut remains expansionary, but less so, consistent with what we showed in Proposition 1 in the simplified model: output rises 1.15%, equipment investment 4.67%, and structures investment 16.68%. The smaller aggregate response reflects the fall in hours for both skilled and unskilled workers. Skilled after-tax wages rise less, reducing skilled hours from 0.330 to 0.327, while unskilled hours are essentially unchanged because the transfer-related wealth effect is absent. Overall, the decrease in skilled and unskilled hours dampens the expansionary

[17] Additionally, we find that structure investment rises more than equipment investment mainly because structures receive a lower expensing rate in our calibration. The production function also makes equipment investment and skilled hours complementary.

effect of capital tax cuts on output and investment.

Wage and consumption inequality still increase, but less than under transfer adjustment because the labor tax burden is shared by both household types. Therefore, consumption of the unskilled does not fall as much, while consumption of the skilled does not increase as much now. The reduced consumption inequality in turn diminishes the role of the wealth effect on labor supply, leading to a smaller increase in the skill premium.[18]

Under consumption tax financing, the consumption tax rate rises from 1.85% to 3.27%. Generally, as emphasized in Proposition 1 for the simple model, the effects are qualitatively similar to those under labor tax rate adjustment, with the distortion coming in labor supply decisions, which leads to a smaller expansionary effect on output compared to transfer adjustment.

Compared to both transfer and labor tax rate adjustments, unskilled consumption rises slightly in the long run (+0.07%), in contrast to the 1.26% decline under transfer adjustment and the 0.90% decline under labor tax adjustment. As with the labor tax adjustment, the burden of the consumption tax rate increase is shared by both household types, so the unskilled household benefits compared to the transfer adjustment case. This numerical result is consistent with what we showed in Proposition 1 in the simplified model in which consumption taxes are relatively less distortionary for labor supply. The same labor-supply channel also produces the smaller increases in wage and consumption inequality under consumption tax adjustment in Table 3: a smaller required tax-rate change generates a smaller labor-supply distortion, which translates—through capital-skill complementarity—into a smaller increase in the skill premium and a smaller widening of consumption inequality.

4 Transition dynamics

We now trace the transition from the initial steady state to the new steady state after a permanent capital tax cut from 35% to 21%. This transition is important because consumption takes about 120 quarters to converge, allowing short-run dynamics to differ sharply from long-run effects. As in the long-run analysis, we present the baseline model under different policy adjustments. One central message of this section is that long-run expansionary effects do not imply expansionary transition dynamics: under nominal rigidities, a permanent capital tax cut can generate a short-run output contraction even when long-run output rises substantially. The transition path is

[18] Our income-inequality measure also increases, and by more than under transfer adjustment, because after-tax labor income decreases.

Table 4: Calibration for transition dynamics

	Value	Description	References
Panel A: Households			
ξ	4.0	Investment adjustment cost	Smets and Wouters (2007)
$\frac{\mathscr{A}''}{\mathscr{A}'}$	0.85	Elasticity of cost of capital utilization	Smets and Wouters (2007)
Panel B: Firms			
α_P	0.65	Calvo sticky price parameter	Smets and Wouters (2007)
γ_P	0.22	Degree of price indexation	Smets and Wouters (2007)
Panel C: Government(Fiscal/Monetary Policy): Transfer or Labor Tax Rate Adjustment			
ρ_1^R	1.12	Interest rate smoothing parameter lag 1	Coibion and Gorodnichenko (2011)
ρ_2^R	-0.23	Interest rate smoothing parameter lag 2	Coibion and Gorodnichenko (2011)
ϕ_π	1.58	Inflation feedback parameter under Taylor rule	Coibion and Gorodnichenko (2011)
ϕ_x	0.11	Output gap feedback parameter under Taylor rule	Coibion and Gorodnichenko (2011)
$\phi_{\Delta y}$	2.21	Output growth feedback parameter under Taylor rule	Coibion and Gorodnichenko (2011)
ρ_1^H	0.869	Transfer/Labor tax rate smoothing parameter lag 1	Estimated (See Appendix D)
ρ_2^H	0.0	Transfer/Labor tax rate smoothing parameter lag 2	Estimated (See Appendix D)
ψ_B^H	0.111	Transfer/Labor tax rate response to debt	Estimated (See Appendix D)
$\psi_{\Delta y}^H$	0.831	Transfer/Labor tax rate response to output growth	Estimated (See Appendix D)
ψ_x^H	0.0	Transfer/Labor tax rate response to output gap	Estimated (See Appendix D)
Panel D: Government(Fiscal/Monetary Policy): BFM Shadow Economy			
ρ_1^R	1.12	Interest rate smoothing parameter lag 1	Coibion and Gorodnichenko (2011)
ρ_2^R	-0.23	Interest rate smoothing parameter lag 2	Coibion and Gorodnichenko (2011)
ϕ_π	0.0	Inflation feedback parameter under Taylor rule	Assigned
ϕ_x	0.0	Output gap feedback parameter under Taylor rule	Assigned
$\phi_{\Delta y}$	0.0	Output growth feedback parameter under Taylor rule	Assigned
ρ_1^H	0.785	Labor tax rate smoothing parameter lag 1	Estimated (See Appendix D)
ρ_2^H	0.107	Labor tax rate smoothing parameter lag 2	Estimated (See Appendix D)
ψ_B^H	0.001	Labor tax rate response to debt	Estimated (See Appendix D)
$\psi_{\Delta y}^H$	1.821	Labor tax rate response to output growth	Estimated (See Appendix D)
ψ_x^H	0.0	Labor tax rate response to output gap	Estimated (See Appendix D)

Notes: Monetary policy rule parameters (ρ_1^R, ρ_2^R, ϕ_π, ϕ_x, $\phi_{\Delta y}$) for the Transfer/Labor Tax Adjustment case are from Coibion and Gorodnichenko (2011), estimated over the post-Volcker period (1983Q1–2002Q4). Fiscal rule parameters (ρ_1^H, ρ_2^H, ψ_B^H, $\psi_{\Delta y}^H$, ψ_x^H) are estimated by OLS from U.S. data; see Appendix D. The first set of fiscal parameters uses 1983Q1–2002Q4 estimates; the second set (BFM) uses 2001Q1–2019Q3 estimates. The consumption tax adjustment cases use the same rule parameters as their labor tax counterparts.

shaped jointly by fiscal financing and the monetary stance, both of which we vary in what follows.

4.1. Parameterization

For transition dynamics, the parameterization of policy rules, investment adjustment costs, nominal rigidities, and capacity utilization costs matters. The parameterization is in Table 4. We use estimates from Smets and Wouters (2007) for investment adjustment costs, capacity

utilization costs, the probability of resetting prices, and the degree of inflation indexation.

We now discuss how we parameterize the policy rules, which govern the associated fiscal and monetary adjustments along the transition. We use estimates from Coibion and Gorodnichenko (2011) for monetary policy rule parameters from the post-Volcker period (1983-2002), in which the Taylor principle is satisfied. For the transfer and tax rule parameters, we use our estimates of the policy rule (2.3) using US data. The details of the estimation are presented in Appendix D and Table F.1 shows the estimation results.

We point out here that the transfer and tax rule parameters we use for the case where transfer and taxes respond sufficiently to debt (Panel C) are based on estimates obtained using post-Volcker period data for the same period as in Coibion and Gorodnichenko (2011) (1983-2002). This combination, using data and estimates for the exact time period, then describes the regime where labor tax rates adjust to ensure stationary debt dynamics while monetary policy stabilizes inflation. The second set of parameters in Panel D of Table 4 is used for the BFM shadow economy. These are based on estimates obtained using data from a later period (2001-2019), in which the monetary policy rule does not satisfy the Taylor principle.[19]

4.2. Fiscal financing and monetary accommodation

We now consider the transition implications of the policy taxonomy described in Section 2.3.3. Table 5 first summarizes the five main cases quantitatively at impact, in the medium run, and in the new steady state. Three messages stand out. First, under standard monetary policy, output contracts on impact under every financing scheme, with both skilled and unskilled consumption falling. Second, temporary monetary accommodation reverses this pattern: under BFM, output rises on impact, and consumption of both household types rises sharply. Third, the new steady state is identical for a given financing scheme regardless of monetary regime—so all differences between BFM and standard monetary policy operate through the transition path. Figure 2 plots the transition paths for the three fiscal financing schemes under standard monetary policy. Figure 3 isolates the two temporary monetary accommodation cases: labor tax adjustment with BFM and consumption tax adjustment with BFM.

[19] In particular, we use $\phi_\pi = 0$, $\phi_{\Delta y} = 0$, and $\phi_x = 0$. We do not formally estimate the monetary policy rule for this sub-period due to the binding ZLB for much of the sample and the lack of enough observations. Passive monetary policy arguably characterizes this period well. Our results are robust to the precise parameterization of ϕ_π as long as it is below 1, as we show in Appendix E.2.

Table 5: Summary of transition dynamics

	Transfer	Labor Tax	Consumption Tax	Labor Tax+BFM	Consumption Tax+BFM
Panel A: Impact					
Output	−0.35	−0.68	−0.06	6.32	7.12
Consumption: Skilled	−0.22	−0.78	−0.36	1.90	2.26
Consumption: Unskilled	−2.85	−3.12	−1.84	11.12	12.85
Equipment Investment	0.59	1.71	1.00	2.56	2.18
Structures Investment	3.33	4.48	3.59	5.27	4.83
Panel B: Medium-run (Q20)					
Output	3.31	1.00	1.60	1.22	1.80
Consumption: Skilled	1.93	−1.03	−0.99	−0.95	−0.83
Consumption: Unskilled	−2.50	−1.62	−0.67	−1.15	−0.18
Equipment Investment	7.73	4.22	6.23	4.61	6.29
Structures Investment	40.78	33.15	36.13	33.53	35.74
Panel C: New steady state					
Output	2.87	1.15	1.68	1.15	1.68
Consumption: Skilled	3.21	0.56	0.87	0.56	0.87
Consumption: Unskilled	−1.26	−0.90	0.07	−0.90	0.07
Equipment Investment	5.85	4.67	5.34	4.67	5.34
Structures Investment	18.66	16.68	17.28	16.68	17.28

Notes: This table reports percentage deviations of key variables from the initial steady state at impact, Q20, and the new steady state, respectively, following a permanent reduction in the capital tax rate from 35% to 21%.

4.2.1. Lump-sum transfer adjustment. We start with transfer adjustment, shown by the blue lines in Figure 2.[20] What makes the short-run distinct from the long-run is that capital tax cuts can now generate a contractionary aggregate effect during the transition periods.

The economy begins with capital stock below its new steady state. The lower capital tax rate reduces the rental rate and induces investment. In the short run, to finance this increase in investment, consumption of the skilled declines initially. Moreover, there is a large decline along the transition in consumption of the unskilled, due to the large decline in transfers. Given this postponement of consumption, combined with sticky prices and investment adjustment costs, output also falls temporarily, before rising towards the new, higher steady state.[21] The temporary fall in output (which is coupled with increased capital stock), in turn, leads to a fall in hours of the skilled. Unskilled hours rise because the transfer decline raises marginal utility, partly mitigating the output contraction.

[20]The dashed straight lines in Figures 2 and 3 represent the new steady state relative to the initial steady state.
[21]The monetary policy rule specification also matters quantitatively.

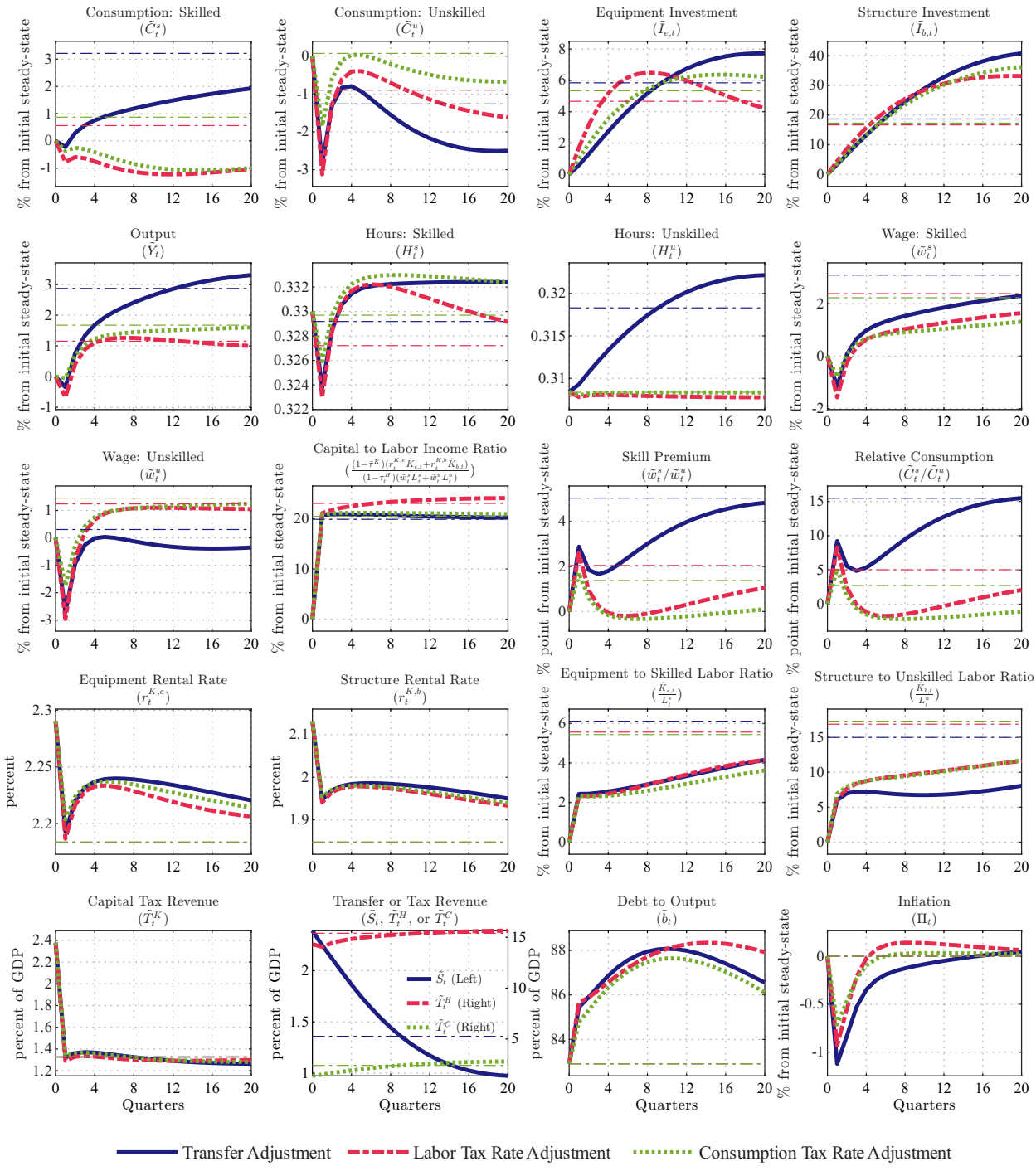


Figure 2: Transition dynamics under standard monetary policy

Notes: Each panel plots the quarterly transition path of a model variable following the permanent capital tax cut from 35% to 21% under standard (active) monetary policy. Colors distinguish the financing scheme: transfer adjustment (blue solid), labor tax rate adjustment (red dash-dot), and consumption tax rate adjustment (green dotted). Thin horizontal lines of the matching color indicate the new long-run steady state to which each path converges

More broadly, this transition pattern reveals a demand-side margin that pure supply-side analysis misses. With nominal rigidities and investment adjustment costs, the economy cannot reallocate resources instantaneously toward the new, higher long-run capital stock; the required surge in investment demand crowds out consumption and pushes output temporarily below its initial level, even though the long-run effect is expansionary. Standard long-run or steady-state assessments of capital tax reform therefore understate the short-run cost of the transition.

Inflation also falls because forward-looking firms price on current and future real marginal costs, which move with wages and capital rental rates. Wages decline through both supply and demand forces: The drop in consumption and the rise in marginal utility of consumption raise the supply of hours for a given wage rate, especially for the unskilled, while labor demand declines as firms produce a smaller amount of output, as discussed above.

Figure 2 shows that the skill premium and consumption inequality increase in the short-run and slowly converge to the new steady state. The capital-to-labor income ratio also increases in the short-run, above the new long-run level. The transfer-adjustment case combines the largest long-run expansion with the most uneven distributional outcome—transfer cuts concentrate the short-run burden on the unskilled hand-to-mouth households. We next examine how distortionary tax financing reshapes this aggregate-distributional tradeoff.

4.2.2. Labor and consumption tax adjustments. We next compare the two distortionary tax instruments under the standard monetary policy rule. The red lines in Figure 2 show labor tax adjustment, with the labor tax rate following the rule in Equation (2.3). Overall, model dynamics are qualitatively similar to those in the transfer adjustment case. We still see capital accumulation, achieved by increased investment and postponement of consumption, which in turn also causes output to fall with sticky prices.

Quantitatively, however, the drop in consumption and output is larger in this case compared to the lump-sum transfer adjustment case. Delayed consumption reduces labor demand, while higher labor taxes further discourage labor supply. Hours fall for both types of households, including the unskilled. This reflects the same labor-supply mechanism emphasized in the long-run analysis. The wealth effect on labor supply is relatively weak for the unskilled because there is no reduction in transfers, and the burden of the increase in the labor tax rate is shared by both types of households. Thus, substitution effects dominate. Overall, the drop in hours of both types in turn amplifies the short-run contraction in consumption and output.

In terms of distributional implications, consumption inequality rises less than under transfer

adjustment because transfers do not fall and the labor tax burden is shared by both households.[22] The labor-tax case nevertheless has the largest impact on output decline among the standard-policy cases in Table 5: output falls by 0.68%, compared with 0.35% under transfer adjustment.

The green lines in Figure 2 show consumption tax adjustment, using the same fiscal-rule parameters as the labor-tax case. The transition is still shaped by the same short-run force: investment rises immediately, while consumption is postponed, so sticky prices turn the capital tax cut into a temporary contraction. However, consumption tax financing is less distortionary for labor supply than labor tax financing. This is the transition counterpart of the analytical and long-run results in Section 3: for a given capital tax cut, the consumption tax requires a smaller increase in the normalized labor-supply wedge than the labor tax when the effective consumption tax base is larger.

This difference is visible both on impact and in the new steady state. In Table 5, output falls by only 0.06% on impact under the consumption tax adjustment, compared with 0.68% under the labor tax adjustment, and the new steady-state output gain is larger under the consumption tax adjustment, 1.68% versus 1.15%. The distributional implications are also more favorable for the unskilled. Because the consumption tax burden is shared through spending rather than levied directly on labor income, and because the aggregate expansion is larger than under labor tax financing, unskilled consumption falls less: the impact decline is 1.84% under consumption tax adjustment compared with 3.12% under labor tax adjustment, and the new steady state shows a small rise of 0.07%. These results help explain why consumption tax financing will be the most favorable distortionary case in the welfare analysis below.

4.2.3. Temporary monetary accommodation via funded/unfunded decomposition. Under the standard Taylor rule, aggressive inflation stabilization contributes to short-run contraction. We ask whether temporary monetary accommodation can remove it, using the funded/unfunded decomposition of Bianchi et al. (2023) to accommodate fiscal expansion temporarily while keeping monetary policy active in the long run.

The key idea is to introduce a *shadow economy* that operates under a PMAF regime, where fiscal policy is active (debt is stabilized through movements in the price level rather than through tax adjustments) and monetary policy is passive. Let variables with the superscript sh denote this shadow economy. The shadow economy receives the same capital tax shock as the actual economy and has the same private-sector equilibrium conditions, but differs in its policy rules.

[22] Labor tax rates change smoothly here, as do transfers.

Specifically, the shadow Taylor rule sets

$$\frac{R_t^{sh}}{\bar{R}} = \left[\frac{R_{t-1}^{sh}}{\bar{R}}\right]^{\rho_1^R} \left[\frac{R_{t-2}^{sh}}{\bar{R}}\right]^{\rho_2^R} \left[\left(\frac{\pi_t^{sh}}{\bar{\pi}}\right)^{\phi_\pi^F}\right]^{\left(1-\rho_1^R-\rho_2^R\right)},$$

where $\phi_\pi^F < 1$ (passive monetary policy), and the shadow fiscal rule features a weak debt response $\psi_B^F \approx 0$ so that the government budget is balanced primarily through inflation surprises.

The actual economy's policy rules then respond to *funded* components, defined as deviations from the shadow economy. The Taylor rule becomes

$$\frac{R_t}{\bar{R}} = \left[\frac{R_{t-1}}{\bar{R}}\right]^{\rho_1^R} \left[\frac{R_{t-2}}{\bar{R}}\right]^{\rho_2^R} \left[\left(\frac{\pi_t/\pi_t^{sh}}{\bar{\pi}/\bar{\pi}}\right)^{\phi_\pi} \left(\frac{\pi_t^{sh}}{\bar{\pi}}\right)^{\phi_\pi^F} \left(\frac{Y_t}{Y_{t-1}}\right)^{\phi_{\Delta y}} \left(\frac{Y_t}{Y_t^n}\right)^{\phi_x}\right]^{\left(1-\rho_1^R-\rho_2^R\right)},$$

where $\phi_\pi > 1$ ensures a strong (active) monetary response to funded inflation π_t/π_t^{sh}, while unfunded inflation π_t^{sh} receives only the passive response ϕ_π^F. Intuitively, to the extent that inflation is driven by the unfunded fiscal component (the shadow economy), the central bank does not raise the interest rate aggressively, thereby accommodating fiscal inflation. The fiscal rule similarly responds to funded debt,

$$\tilde{b}_t^{funded} \equiv \tilde{b}_t - \tilde{b}_t^{sh},$$

rather than total debt $\tilde{b}_t$, so fiscal adjustment is deferred to the extent that debt dynamics are absorbed by the unfunded component.

Both actual and shadow economies converge to the same terminal steady state, ensuring long-run fiscal solvency. The shadow economy is parameterized with $\phi_\pi^F = 0$, $\psi_B^F = 0.001$, $\rho_1^F = 0.785$, $\rho_2^F = 0.107$, and $\psi_{\Delta y}^F = 1.821$, based on our fiscal rule estimates from the post-2001 period.[23] The actual economy's Taylor rule uses $\phi_\pi = 1.58$. The full equilibrium conditions for the BFM extension are presented in Appendix A.3.

Figure 3 shows that BFM eliminates the short-run contraction under labor and consumption tax financing: output and unskilled consumption rise on impact. The mechanism is that the central bank accommodates the part of inflation associated with the unfunded fiscal component rather than raising nominal interest rates aggressively against it. This reduces the real value of nominal government liabilities and lowers the required near-term fiscal adjustment, so private demand does not fall as sharply as under the standard Taylor rule.

[23] The choice of $\phi_\pi^F = 0$ implies the shadow central bank pegs the interest rate, representing maximal monetary accommodation of fiscal shocks. The shadow fiscal parameters are taken from the post-Volcker PMAF subsample, as in Bianchi et al. (2023).

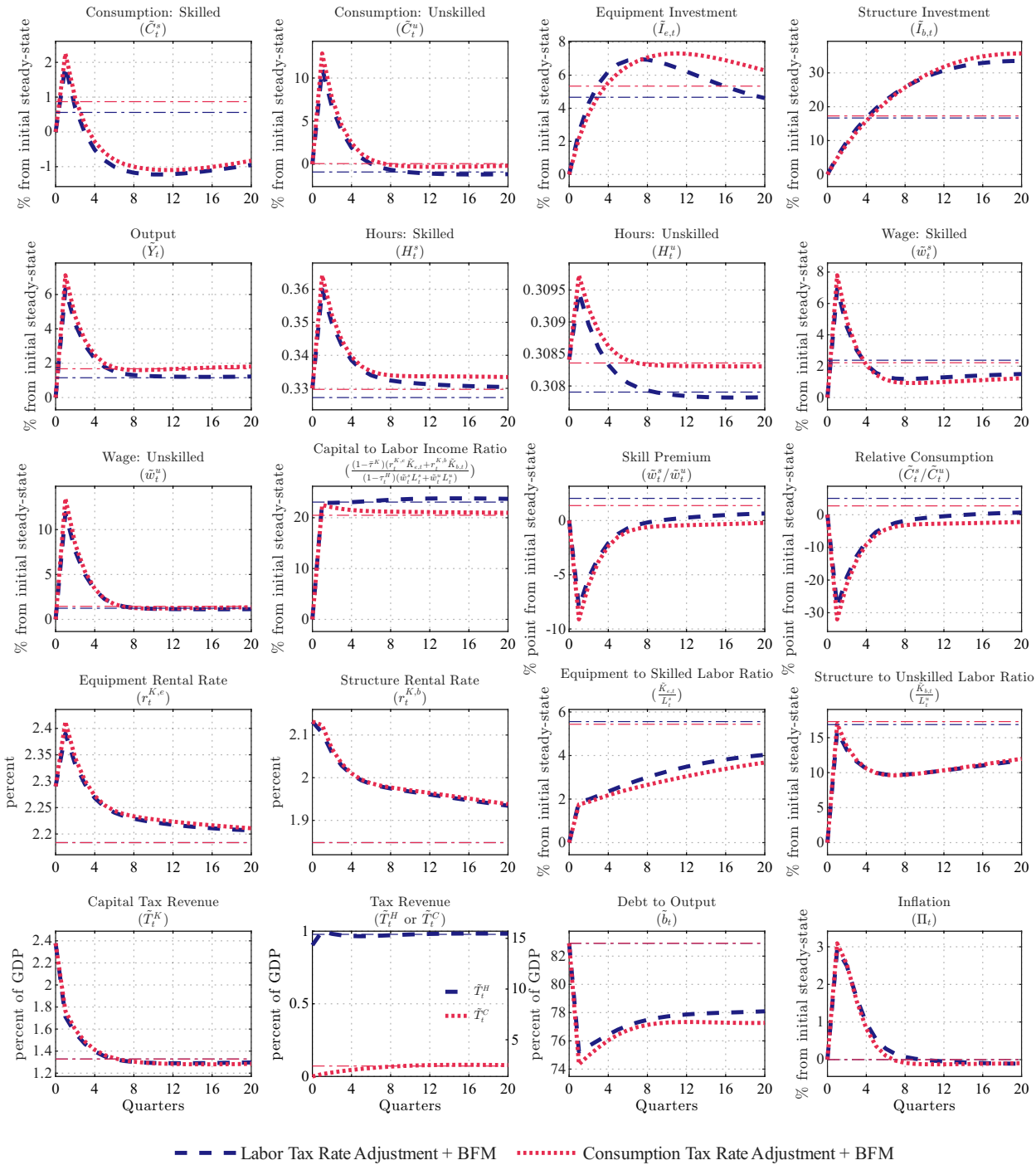


Figure 3: Transition dynamics with temporary monetary accommodation

Notes: Each panel plots a quarterly transition path of a model variable under temporary monetary accommodation implemented via the BFM funded/unfunded decomposition, for the two distortionary financing schemes: labor tax rate adjustment with BFM (blue dashed) and consumption tax rate adjustment with BFM (red dotted).

The comparison between the two BFM cases mirrors the ranking under standard monetary policy, but now from an expansionary short-run path. Table 5 shows that consumption

tax adjustment with BFM produces the largest impact responses among the five main cases: output rises by 7.12% and unskilled consumption rises by 12.85%, compared with 6.32% and 11.12% under labor tax adjustment with BFM.[24] Because BFM changes the transition but not the terminal steady state, the long-run ranking remains the one emphasized above: consumption tax financing preserves the larger aggregate expansion and now yields a small positive long-run change in unskilled consumption, relative to labor tax financing.

The inflation increase is temporary because the funded component still preserves long-run stability under active monetary/passive fiscal policy. After about 8 quarters, dynamics converge toward the corresponding non-BFM path. The accommodation favors the unskilled because government debt is held by the skilled, whose real wealth falls with inflation, while unskilled households benefit more from the lower tax increases that BFM permits.

5 Welfare evaluation

Our results in the previous sections suggest that a reduction of the capital tax rate has different welfare implications depending on the time horizon, household types, and policy adjustments. In this section, we formally calculate a measure of welfare gain that can be achieved through a permanent capital tax cut, taking into account transition dynamics as well as the long-run effect.

Our measure of welfare gain for type-i agent, $\mu^i_{k,t}$, is implicitly defined by the sequence of values satisfying

$$\sum_{j=0}^{t} \beta^j U\left(\tilde{C}^i_j, H^i_j\right) = \sum_{j=0}^{t} \beta^j U\left(\left(1+\mu^i_{k,t}\right)\bar{\tilde{C}}^i_j, \bar{H}^i_j\right),$$

where $\left\{\tilde{C}^i_j, H^i_j\right\}$ and $\left\{\bar{\tilde{C}}^i_j, \bar{H}^i_j\right\}$ are respectively the time path of type-i agent's normalized consumption and hours with and without a capital tax cut under the various fiscal/monetary adjustments (indexed by k) we have considered above. We denote by $\mu^i_{T,t}$ the case of transfer adjustment, by $\mu^i_{H,t}$ the case of labor tax rate adjustment, and by $\mu^i_{C,t}$ the case of consumption tax rate adjustment. Thus, $\mu^i_{k,t}$ measures welfare gains from period 0, when the tax reform initiates, till (arbitrary) period t, in units of a percentage of the level of normalized initial consumption.[25] The lifetime (total) welfare gain is then measured by $\lim_{t\to\infty} \mu^i_{k,t}$, which is of interest in the business cycle literature (Lucas 1987).

[24] These large short-run effects reflect a deliberately stylized accommodation experiment ($\phi^F_\pi = 0$, $\psi^F_B \approx 0$) designed to isolate the unfunded-inflation channel rather than a literal quantitative account of post-TCJA dynamics; the channel itself is what we want to highlight, not the precise magnitudes.

[25] It thus measures welfare gains at the point when the agents are t quarters old.

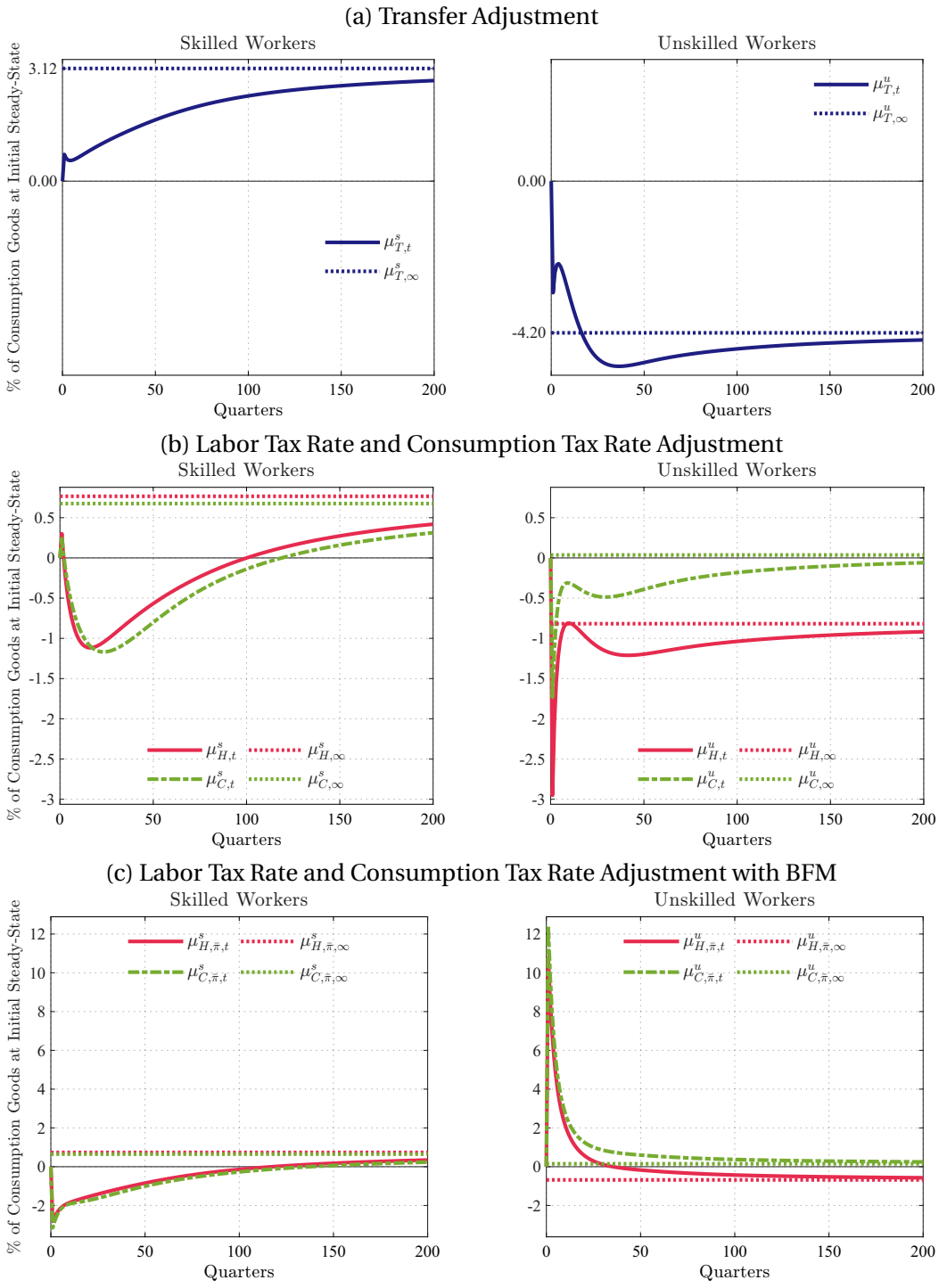


Figure 4: Welfare implications of a permanent capital tax rate decrease

Notes: Each panel reports the cumulative welfare gain from the capital tax changes for skilled (left) and unskilled (right) households, expressed as a percentage of initial-steady-state consumption. Sloped lines trace the running total $\mu^i_{k,t}$, and horizontal dotted lines the lifetime value $\mu^i_{k,\infty}$. Panel (a): transfer adjustment (blue). Panel (b): labor tax rate adjustment (red) and consumption tax rate adjustment (green) under standard monetary policy. Panel (c): the same two schemes with BFM.

Table 6: Welfare comparison

	Transfer	Labor Tax	Consumption Tax	Labor Tax+BFM	Consumption Tax+BFM
Skilled	3.12	0.77	0.68	0.74	0.65
Unskilled	−4.20	−0.82	0.04	−0.68	0.15

Notes: The table reports lifetime equivalent consumption variation (%) following a permanent reduction in the capital tax rate from 35% to 21%. "BFM" denotes the funded/unfunded decomposition of Bianchi et al. (2023).

Consumption-tax financing yields positive lifetime welfare gains for both household types even under standard monetary policy: skilled households gain 0.68%, and unskilled households gain 0.04% (panel (b) of Figure 4; Table 6). Temporary monetary accommodation raises the unskilled welfare gain while keeping both household types' gains positive: consumption-tax + BFM (panel (c)) produces the largest unskilled welfare gain across the five specifications, 0.15%, while the skilled gain is slightly lower, 0.65% versus 0.68% without accommodation. This comparison isolates the joint role of transition dynamics and fiscal financing. Tables 3 and 5 show that temporary monetary accommodation leaves the new steady state unchanged for any given financing scheme—under consumption tax financing, long-run output still rises 1.68% and unskilled consumption rises 0.07% with or without BFM. The decisive change is on the transition path: BFM raises output and consumption on impact rather than contracting them. The welfare ranking in Table 6 therefore depends not only on long-run output or consumption gains, but also on how the fiscal burden is distributed across households and how monetary policy manages the transition.

The comparison across financing schemes clarifies why consumption taxation alone delivers a near-Pareto improvement. Consumption tax adjustment (panel (b)) yields unskilled lifetime welfare of +0.04%, versus −0.82% under labor tax adjustment and −4.20% under transfer adjustment. This result may seem at odds with the conventional view that consumption taxes are regressive: that view rests on a partial-equilibrium incidence comparison at fixed quantities, whereas the welfare comparison here is in general equilibrium and includes the labor-supply, output, and incidence consequences of the alternative financing instruments. The mechanism operates through the broader effective tax base of consumption taxation: a smaller wedge increase produces a smaller labor-supply distortion, a larger aggregate expansion, and a more evenly distributed burden across household types. Temporary monetary accommodation amplifies the unskilled gain to 0.15%—the largest across all specifications—by raising short-run output and consumption. By contrast, BFM under labor tax adjustment improves unskilled welfare only

modestly, from −0.82% to −0.68%, because the long-run labor-supply distortion remains.

Under transfer adjustment, the tax reform is not a Pareto improvement: skilled households gain at the expense of unskilled households, which consume less and work more through wealth effects on labor supply. Lifetime gains are 3.12% for the skilled and −4.20% for the unskilled (Panel (a) of Figure 4 and Table 6).[26] Turning to the short-run, skilled welfare never becomes negative, while unskilled welfare never becomes positive.

Labor tax adjustment also fails to deliver a Pareto improvement, as shown in panel (b) of Figure 4. Skilled gains are smaller than under transfer adjustment and become positive only after 80 quarters, but unskilled losses are also smaller because the labor tax burden is shared. This finding implies that lump-sum transfer adjustment, while leading to a higher level of aggregate output, is not necessarily a better policy response than labor tax rate adjustment in our model.

6 External validation

The Tax Cuts and Jobs Act (TCJA) of December 2017 reduced the U.S. statutory corporate tax rate from 35% to 21%, providing a useful external benchmark. We do not treat this section as a full empirical validation exercise: the TCJA was a multi-provision package, while our model studies a cleaner permanent capital tax cut that isolates financing and monetary-fiscal transition mechanisms. The model captures the permanent rate reduction and baseline depreciation allowances but abstracts from individual income tax provisions, temporary bonus depreciation, interest-deductibility limits, international provisions, repatriation, and partial anticipation. The evidence below should therefore be read as a comparison with relevant moments and mechanisms, not as a structural evaluation of the TCJA as a whole. The COVID-19 pandemic further truncates the post-treatment window to roughly eight quarters (2018Q1–2019Q4).

Revenue. The corporate tax revenue decline is the tightest quantitative match between our model and the post-TCJA data. Revenue fell from about 1.5% of GDP in 2017 to 1.0% in 2018; Chodorow-Reich, Zidar and Zwick (2024b) summarize the business provisions as reducing corporate tax revenue by roughly 40% of the pre-reform level. Our model predicts capital tax revenue falls from 2.38% to 1.33% of Y_{adj}, a 44% decline on a broader capital-income base. Dynamic scoring exercises imply that the TCJA was only partially self-financing, consistent with our finding that the capital tax cut does not pay for itself under any financing scheme.

[26] The lifetime welfare gains are the dotted lines in Figure 4.

Wages and distribution. Kennedy et al. (2026) provide strong support for the model's distributional prediction: the TCJA's effect on worker earnings was statistically zero below the 90th percentile, with significant gains only for top earners. This pattern is consistent with our capital-skill complementarity mechanism, in which capital deepening after a corporate tax cut raises skilled wages disproportionately. Our two-group framework aggregates the top 41% as "skilled," so it cannot reproduce the sharp 90th-percentile threshold; doing so would require finer skill gradations. Nonetheless, gains concentrated at the top, with negligible or negative effects for lower-skilled workers, are distinctive to capital-skill complementarity and absent from standard TCJA assessments. Nallareddy, Rouen and Suarez Serrato (2022) further document that state corporate tax cuts raise the top 1% pretax income share, with the gains driven primarily by capital income at the top of the distribution. The broader incidence literature also finds heterogeneous wage effects, though not always the same pattern: Fuest, Peichl and Siegloch (2018) find that workers bear about half of the German local corporate tax burden, with larger burdens on low-skilled, young, and female employees.

In our baseline, the skill premium rises by +0.8% to +2.8% and consumption inequality (c_s/c_u) by +0.8% to +4.5%, depending on financing. In Kennedy et al. (2026)'s aggregation exercise, 87% of corporate-tax-cut gains accrue to the top 10%. These top-skewed gains, with limited or negative effects for lower-skilled workers, qualitatively validate the capital-skill-complementarity channel absent from most TCJA analyses.

The closest data analogue to the after-tax capital-to-labor income ratio is the after-tax corporate profits to employee compensation ratio in the nonfinancial corporate sector, which rose about 7–8% from 2017Q4 to 2019Q4 (off a flat 2015–17 pre-trend) with the increase concentrated in 2018. In our model, the same ratio rises after the capital tax cut under all three financing schemes, while the labor share is flat (transfer/consumption financing) or falls (labor-tax financing)—qualitatively matching the post-TCJA rise in capital's share of corporate income.

GDP. U.S. GDP growth accelerated from roughly 2.3% in 2017 to 2.9% in 2018 before moderating to 2.3% in 2019. The acceleration in 2018 is broadly consistent with a modest positive short-run output effect, but attribution is confounded by concurrent discretionary spending increases, aggregate demand, and global conditions (Gale and Haldeman, 2021). Complementing this raw comparison, the reduced-form near-term projections of Mertens (2018), which apply a range of existing empirical tax multiplier estimates to TCJA's projected revenue impact, imply a 2018 GDP gain of about 1.3–1.8 percentage points (depending on whether one accounts for

the individual/corporate composition of the cuts) and a cumulative 2018–2020 effect of roughly 1.3–1.4 pp, with most of the boost in 2018 and a mild reversal thereafter. This front-loaded pattern sits in a comparable range to our model's short-run transition responses.

Investment. Aggregate BEA data show limited investment response: the equipment investment-to-GDP ratio barely moved from 5.9% (2015–16) to just over 6.0% (2018–19), and the structures share was essentially unchanged. This muted aggregate response is consistent with the broader post-TCJA evidence in Gale and Haldeman (2021), who argue that investment growth after the reform is difficult to attribute cleanly to supply-side tax incentives because it also reflected aggregate demand, oil prices, and intellectual property investment.

At the same time, the weak aggregate response can mask heterogeneous exposure to the tax incentives. The TCJA changed user costs unevenly across asset types, industries, and firms: bonus depreciation favored equipment more than structures, while interest-deductibility limits and other base broadeners worked in the opposite direction. At the asset-category level, Hartley et al. (2026) show that BEA asset categories with larger reductions in user cost and marginal effective tax rates experienced larger investment-rate gains (an investment elasticity of −2.11, with a 1pp user-cost decrease raising the investment rate by 1.86pp), directly validating the user-cost channel that drives capital deepening in our model. Chodorow-Reich et al. (2024a) provide complementary firm-level micro-evidence: firms facing larger reductions in their effective tax wedge increased domestic investment more, with the mean firm raising domestic investment by about 20% relative to a no-change baseline. Embedding these estimates in a multinational user-cost model, they obtain a long-run effect on U.S. domestic capital of +7% (+13% on total capital including foreign affiliates); this reflects the full TCJA package while our experiment isolates the rate cut, so the two are not directly comparable, but our predicted capital deepening is broadly consistent. By contrast, the gap between our model and aggregate BEA data likely reflects omitted TCJA features—especially Section 163(j), bonus-depreciation heterogeneity, international provisions, and sectoral conditions—that partially offset or reallocated the investment response (Occhino, 2020).

Inflation and interest-rate dynamics. Inflation and interest rates after the TCJA are broadly consistent with the mild, temporary monetary accommodation captured by our BFM regime, although the evidence is necessarily indirect. Core PCE inflation rose from 1.6% in late 2017 to a peak near 2.0% in mid-2018 before drifting back to 1.5–1.7% through 2019, remaining close to the Fed's 2% target. The effective federal funds rate rose from 1.3% at TCJA passage to a 2.4%

Table 7: Comparison of model-based GDP effects of TCJA-style capital tax cuts

Study	Model Type	GDP Effect	Distributional
Our model (transfer adj.)	NK-DSGE, TANK, CSC	+2.87%	Yes
Our model (labor tax adj.)	NK-DSGE, TANK, CSC	+1.15%	Yes
Our model (cons tax adj.)	NK-DSGE, TANK, CSC	+1.68%	Yes
Barro and Furman (2018)	Neoclassical, 5 capital types	+0.9–3.1%	No
Lieberknecht and Wieland (2019)	Two-country NK-DSGE	+2.1–2.6%	No
CBO (2018)	Solow + OLG	+0.7% avg. level	No
PWBM (2017)	OLG, het. agents	+0.6–1.1%	Yes
Tax Foundation (2017)	Neoclassical	+1.7%	No
JCT (2017)	MEG + OLG + DSGE	+0.1–0.9%	No

Notes: All studies analyze the TCJA or an equivalent corporate tax cut. Reported horizons differ across studies: long-run effects for steady-state models, 2027 effects for PWBM, and budget-window effects for official dynamic scores. GDP effects differ due to modeling assumptions on financing, openness, and crowding-out. "CSC" denotes capital-skill complementarity. PWBM denotes the Penn Wharton Budget Model.

peak in mid-2019 before the Fed reversed course with 75 basis points of cuts in the second half of 2019. Long-term real rates also remained subdued, with the 10-year TIPS real yield ending 2019 some 36 basis points below its TCJA-passage level. Taken together, monetary policy did not offset the fiscal expansion aggressively enough to generate persistently higher real rates, qualitatively consistent with the temporary-accommodation channel studied in our paper.

Comparison with model-based analyses. Table 7 compares our results with other TCJA assessments. Our labor tax adjustment case (+1.15% long-run GDP) falls below Lieberknecht and Wieland (2019) (+2.1% medium-run, +2.6% long-run), who use a two-country New Keynesian DSGE model without household heterogeneity, but lies in the same broad range. Official dynamic scores are lower: CBO (2018) projects real GDP to be 0.7% higher on average over 2018–2028, while JCT (2017) projects a 0.7% average output effect, with 0.8–0.9% effects over most of the budget window and 0.1–0.2% by the end. These smaller effects reflect debt-financed crowding-out, absent from our transfer case but partially present under distortionary financing. Our transfer adjustment case (+2.87%) is close to Barro and Furman (2018)'s provisions-permanent scenario (+3.1%), which uses a neoclassical model without crowding-out. These comparisons underscore that financing is a first-order determinant of predicted output effects. Our contribution is to jointly analyze financing, capital-skill complementarity, and distributional effects; no other entry in Table 7 combines all three. Reduced-form empirical projections of TCJA's near-term GDP impact (Mertens, 2018) provide a complementary, non-structural benchmark in a similar magnitude range for the first post-reform years.

Limitations. Several TCJA features fall outside our model's scope. The closed-economy framework omits repatriation: U.S. firms repatriated hundreds of billions of dollars in 2018, much of it directed toward stock buybacks rather than domestic investment (Gravelle and Marples, 2019). We also abstract from individual income tax provisions, bonus-depreciation heterogeneity across assets, and partial anticipation of the reform.[27] Still, the model's match with key post-TCJA moments—especially the revenue decline and top-skewed wage gains—supports the relevance of capital-skill complementarity for corporate tax reform.

7 Sensitivity analysis

We close with sensitivity analyses, summarized here and detailed in Appendix E. These exercises check whether the main results rely on a narrow calibration, on specific distributional assumptions, or on the baseline monetary-fiscal regime. The answer is broadly no: aggregate responses are stable across the main perturbations, while distributional magnitudes are most sensitive to how fiscal payments and profits are allocated across household types.

Long-run results. Appendix Section E.1 reports three long-run checks. Varying the Frisch elasticity changes the strength of labor-supply responses: higher elasticities amplify output gains under transfer adjustment, where the tax cut mostly works through capital deepening and wealth effects on hours, but dampen output gains under labor tax adjustment, where the required labor tax increase creates a stronger hours distortion. This widens the gap predicted by Proposition 1 (Appendix Figures F.1–F.4). Alternative profit and transfer assignments affect distributional variables rather than aggregates. If skilled workers receive both profits and transfer changes, consumption inequality declines, while aggregate output remains similar due to the same capital accumulation margin (Appendix Figure F.5). Since the equipment-share parameter λ governs how much equipment capital enters production, it controls the quantitative strength of the capital-skill complementarity channel that drives our distributional results. Varying λ leaves aggregate results qualitatively robust because the capital-tax cut still lowers the user cost of capital and raises investment, though lower λ is more favorable for unskilled consumption by weakening equipment-skill complementarity (Appendix Figures F.6–F.7).

Transition dynamics. Appendix Section E.2 shows that BFM transition dynamics are robust to the shadow-economy Taylor rule coefficient as long as $\phi_\pi^F < 1$ (Appendix Figure F.8). This condition keeps the shadow-economy monetary policy passive, such that the price level absorbs

[27] Partial anticipation is examined separately in the sensitivity analysis in Appendix E.3.

the unfunded component of the fiscal shock; the exact value affects the size and timing of inflation and debt dynamics, but not the qualitative expansionary effect. Alternative profit and transfer distributions matter more for distribution than aggregates: when skilled workers receive both profits and transfers, unskilled consumption falls only briefly, skilled consumption falls persistently, and both consumption and wage inequality decline after a few periods (Appendix Figure F.9). Anticipation of the tax cut—relevant for the TCJA, which markets began pricing after the November 2016 election—delays investment during the announcement window and deepens the initial contraction, but the long-run incidence is unchanged (Appendix Figure F.10).

Welfare results. Appendix Section E.4 shows that the welfare ranking across the three standard financing schemes is robust to Frisch elasticities and equipment shares: transfer and labor tax adjustment deliver clear unskilled welfare losses, while consumption tax adjustment yields the most favorable unskilled outcome (Appendix Figures F.11 and F.12). The ranking is also robust under permanent PMAF (Appendix Figure F.13). The positive welfare gain for both household types under consumption-tax financing alone is also broadly robust: unskilled welfare stays positive across Frisch elasticities and at the baseline and lower equipment-share values, with only a small loss at the upper end of the range considered, where the stronger capital-skill complementarity widens distributional gaps. These welfare comparisons are informative because they aggregate both the short-run transition and the long-run steady-state effects; a policy that raises long-run output can still reduce welfare for the household type bearing the fiscal adjustment. Appendix Figure F.14 reports a dedicated sensitivity exercise over the Frisch elasticity, λ, N^s, and BFM policy parameters. Unskilled welfare under consumption tax+BFM remains positive across the entire grid, confirming that this case robustly avoids a clear unskilled welfare loss.

Additional robustness exercises. The Appendix reports four further robustness checks. Full expensing ($\lambda_e = 1$)—matching the TCJA's temporary expansion of bonus depreciation to full equipment expensing through 2022—amplifies the equipment-investment response and produces a modestly larger output gain (Appendix Figure F.15). Fixing government spending in levels creates fiscal space as G/Y falls, requiring smaller labor tax increases and moderating the transition costs of fiscal adjustment (Appendix Figure F.16). Varying the skilled labor share dilutes distributional effects when the skilled group is larger but leaves aggregate outcomes largely unchanged (Appendix Figure F.17). Finally, replacing temporary BFM accommodation with a permanent PMAF regime produces qualitatively similar but larger short-run effects, reflecting

a permanent rather than temporary accommodation (Appendix Figure F.18). In all cases, the qualitative results and welfare rankings are robust.

8 Conclusion

This paper studies the aggregate, distributional, and welfare effects of a permanent reduction in the capital tax rate from 35% to 21%. Its main implication is that capital tax reform cannot be evaluated solely through long-run supply-side effects: financing choices and monetary accommodation fundamentally shape both the transition dynamics and the distribution of gains. Financing choices determine both the size of the expansion and its incidence: transfer adjustment yields the largest output gain (+2.9%) and inequality increase, labor tax adjustment a smaller expansion (+1.2%), and consumption tax adjustment (+1.7%) the most favorable unskilled outcome. Monetary policy determines the transition: under a standard Taylor rule, output contracts on impact, while temporary accommodation through the funded/unfunded decomposition of Bianchi et al. (2023) eliminates the contraction. Consumption-tax financing yields positive lifetime welfare gains for both skilled and unskilled households under standard monetary policy; temporary monetary accommodation raises the unskilled gain further—while leaving the skilled gain slightly lower and both types' gains positive—by revaluing the nominal debt held by skilled households. The underlying force is capital-skill complementarity: lower capital taxation raises investment, equipment capital deepening raises skilled wages disproportionately, and hand-to-mouth unskilled households are exposed to the fiscal adjustment. This mechanism helps explain why the model matches the post-TCJA revenue decline and predicts top-skewed wage gains consistent with recent evidence (Kennedy et al., 2026, Chodorow-Reich et al., 2024a).

There are several avenues for future research. The closed-economy model omits repatriation and international tax competition; the TCJA induced a large repatriation response, with funds largely directed toward financial transactions rather than domestic investment (Gravelle and Marples, 2019). The TANK setup assigns hand-to-mouth status to all unskilled households, above the estimated share in Kaplan, Violante and Weidner (2014); a Bewley-Huggett-Aiyagari model could allow partial smoothing and likely temper the distributional magnitudes. Finally, recent debates over extending business-tax provisions and further reducing corporate rates make the financing question studied here directly relevant to current fiscal policy debates.

References

Altig, David, Alan J. Auerbach, Laurence J. Kotlikoff, Kent A. Smetters, and Jan Walliser, "Simulating Fundamental Tax Reform in the United States," *American Economic Review*, 2001, *91* (3), 574–595.

Autor, David H., "Skills, Education, and the Rise of Earnings Inequality Among the "Other 99 Percent"," *Science*, 2014, *344* (6186), 843–851.

Barro, Robert and Jason Furman, "Macroeconomic Effects of the 2017 Tax Reform," *Brookings Papers on Economic Activity*, 2018, *49* (1), 257–345.

Bhattarai, Saroj, Jae Won Lee, and Choongryul Yang, "Redistribution and the Monetary–Fiscal Policy Mix," *Quantitative Economics*, 2023, *14* (3), 817–853.

_ , _ , and Woong Yong Park, "Policy Regimes, Policy Shifts, and U.S. Business Cycles," *The Review of Economics and Statistics*, 2016, *98* (5), 968–83.

Bianchi, Francesco and Leonardo Melosi, "Escaping the Great Recession," *American Economic Review*, 2017, *107* (4), 1030–1058.

_ , Renato Faccini, and Leonardo Melosi, "A Fiscal Theory of Persistent Inflation," *Quarterly Journal of Economics*, 2023, *138* (4), 2127–2179.

Bilbiie, Florin O., Tommaso Monacelli, and Roberto Perotti, "Public Debt and Redistribution with Borrowing Constraints," *The Economic Journal*, 2013, *123* (566), F64–F98.

Blanchard, Olivier and Roberto Perotti, "An Empirical Characterization of the Dynamic Effects of Changes in Government Spending and Taxes on Output," *The Quarterly Journal of Economics*, 2002, *117* (4), 1329–68.

Bohn, Henning, "The Behavior of U.S. Public Debt and Deficits," *The Quarterly Journal of Economics*, 1998, *113* (3), 949–63.

Chodorow-Reich, Gabriel, Matthew Smith, Owen Zidar, and Eric Zwick, "Tax Policy and Investment in a Global Economy," NBER Working Paper 32180, National Bureau of Economic Research 2024.

_ , Owen Zidar, and Eric Zwick, "Lessons from the Biggest Business Tax Cut in US History," *Journal of Economic Perspectives*, 2024, *38* (3), 61–88.

Coibion, Olivier and Yuriy Gorodnichenko, "Monetary Policy, Trend Inflation, and the Great Moderation: An Alternative Interpretation," *American Economic Review*, 2011, *101* (1), 341–70.

Coleman, Wilbur John II, "Welfare and Optimum Dynamic Taxation of Consumption and Income," *Journal of Public Economics*, 2000, *76* (1), 1–39.

Congressional Budget Office, "The Budget and Economic Outlook: 2018 to 2028," Technical Report 53651, Congressional Budget Office April 2018.

Domeij, David and Jonathan Heathcote, "On The Distributional Effects Of Reducing Capital Taxes," *International Economic Review*, 2004, *45* (2), 523–54.

Fuest, Clemens, Andreas Peichl, and Sebastian Siegloch, "Do Higher Corporate Taxes Reduce Wages? Micro Evidence from Germany," *American Economic Review*, 2018, *108* (2), 393–418.

Gale, William G. and Claire Haldeman, "The Tax Cuts and Jobs Act: Searching for Supply-Side Effects," *National Tax Journal*, 2021, *74* (4), 895–914.

Galí, Jordi, J. David López-Salido, and Javier Vallés, "Understanding The Effects of Government Spending on Consumption," *Journal of the European Economic Association*, 2007, *5* (1), 227–70.

Gravelle, Jane G. and Donald J. Marples, "The Economic Effects of the 2017 Tax Revision: Preliminary Observations," Technical Report R45736, Congressional Research Service 2019.

Hartley, Jonathan S., Kevin A. Hassett, and Joshua D. Rauh, "Firm Investment and the User Cost of Capital: New U.S. Corporate Tax Reform Evidence," *Tax Policy and the Economy*, 2026, *40*, 171–206.

He, Hui and Zheng Liu, "Investment-Specific Technological Change, Skill Accumulation, and Wage Inequality," *Review of Economic Dynamics*, 2008, *11* (2), 314–334.

House, Christopher L. and Matthew D. Shapiro, "Temporary Investment Tax Incentives: Theory with Evidence from Bonus Depreciation," *American Economic Review*, 2008, *98* (3), 737–68.

Joint Committee on Taxation, "Macroeconomic Analysis of the Conference Agreement for H.R. 1, the "Tax Cuts and Jobs Act"," Technical Report JCX-69-17, Joint Committee on Taxation December 2017.

Kaplan, Greg, Giovanni L. Violante, and Justin Weidner, "The Wealthy Hand-to-Mouth," *Brookings Papers on Economic Activity*, 2014, *2014* (1), 77–138.

Kennedy, Patrick, Christine Dobridge, Paul Landefeld, and Jacob Mortenson, "Corporate Tax Cuts, Firm Growth, and Workers' Earnings," *Working Paper*, 2026.

Krusell, Per, Lee E. Ohanian, José-Víctor Ríos-Rull, and Giovanni L. Violante, "Capital-Skill Complementarity and Inequality: A Macroeconomic Analysis," *Econometrica*, 2000, *68* (5), 1029–53.

Leeper, Eric M., Michael Plante, and Nora Traum, "Dynamics of Fiscal Financing in the United States," *Journal of Econometrics*, 2010, *156* (2), 304–321.

Lieberknecht, Philipp and Volker Wieland, "On the Macroeconomic and Fiscal Effects of the Tax Cuts and Jobs Act," IMFS Working Paper Series 131, Institute for Monetary and Financial Stability, Goethe University Frankfurt 2019.

Lucas, Robert E., Jr., *Models of Business Cycles*, Oxford [Oxfordshire]: B. Blackwell, 1987.

Maliar, Lilia and Serguei Maliar, "Capital-Skill Complementarity and Balanced Growth," *Economica*, 2011, *78* (310), 240–59.

Mendoza, Enrique G., Assaf Razin, and Linda L. Tesar, "Effective Tax Rates in Macroeconomics: Cross-Country Estimates of Tax Rates on Factor Incomes and Consumption," *Journal of Monetary Economics*, 1994, *34* (3), 297–323.

Mertens, Karel, "The Near Term Growth Impact of the Tax Cuts and Jobs Act," Working Paper 1803, Federal Reserve Bank of Dallas 2018.

_ **and Morten O. Ravn**, "The Dynamic Effects of Personal and Corporate Income Tax Changes in the United States," *American Economic Review*, 2013, *103* (4), 1212–47.

Mountford, Andrew and Harald Uhlig, "What are the Effects of Fiscal Policy Shocks?," *Journal of Applied Econometrics*, 2009, *24* (6), 960–92.

Nallareddy, Suresh, Ethan Rouen, and Juan Carlos Suarez Serrato, "Do Corporate Tax Cuts Increase Income Inequality?," *Tax Policy and the Economy*, 2022, *36*, 35–91.

Nguyen, Anh D. M., Luisanna Onnis, and Raffaele Rossi, "The Macroeconomic Effects of Income and Consumption Tax Changes," *American Economic Journal: Economic Policy*, 2021, *13* (2), 439–466.

Occhino, Filippo, "The Effect of the 2017 Tax Reform on Investment," Economic Commentary 2020-17, Federal Reserve Bank of Cleveland 2020.

Ohanian, Lee E., Musa Orak, and Shihan Shen, "Revisiting Capital-Skill Complementarity, Inequality, and Labor Share," *Review of Economic Dynamics*, 2023, *51*, 479–505.

Penn Wharton Budget Model, "The Tax Cuts and Jobs Act, as Reported by Conference Committee (12/15/17): Static and Dynamic Effects on the Budget and the Economy," Technical Report, Penn Wharton Budget Model December 2017.

Romer, Christina D. and David H. Romer, "The Macroeconomic Effects of Tax Changes: Estimates Based on a New Measure of Fiscal Shocks," *American Economic Review*, 2010, *100* (3), 763–801.

Sims, Eric and Jonathan Wolff, "The State-Dependent Effects of Tax Shocks," *European Economic Review*, 2018, *107*, 57–85.

Slavík, Ctirad and Hakki Yazici, "On the Consequences of Eliminating Capital Tax Differentials," *Canadian Journal of Economics*, 2019, *52* (1), 225–52.

Smets, Frank and Rafael Wouters, "Shocks and Frictions in US Business Cycles: A Bayesian DSGE Approach," *American Economic Review*, 2007, *97* (3), 586–606.

Tax Foundation, "Preliminary Details and Analysis of the Tax Cuts and Jobs Act," Technical Report, Tax Foundation December 2017.

Trabandt, Mathias and Harald Uhlig, "The Laffer Curve Revisited," *Journal of Monetary Economics*, 2011, *58* (4), 305–27.

Online Appendix for "Financing Capital Tax Cuts: Aggregate, Distributional, and Welfare Effects"

A Model with household heterogeneity

This appendix presents the full set of equilibrium conditions for the baseline model with household heterogeneity described in Section 2. We first define the detrended (stationary) variables, then list all equilibrium conditions in their nonlinear form, and finally derive the steady-state equations used for calibration.

A.1. Stationary equilibrium

A.1.1. Notations. A balanced growth path can be achieved if $\frac{A_t}{A_{t-1}} = \bar{a} = \gamma^{1-\alpha}$ and $\frac{q_t}{q_{t-1}} = \gamma_q = \frac{1}{\gamma}$, i.e. $\gamma_q \gamma = 1$. In this case, the growth rate of output $\frac{Y_t}{Y_{t-1}} = \gamma$.

$$\text{Quantities}: \tilde{C}^s_t = \frac{C^s_t}{\gamma^t}, \tilde{C}^u_t = \frac{C^u_t}{\gamma^t},\ \tilde{I}^s_{b,t} = \frac{I^s_{b,t}}{\gamma^t},\ \tilde{I}^s_{e,t} = \frac{I^s_{e,t}}{\gamma^t},\ \tilde{K}^s_{b,t} = \frac{K^s_{b,t}}{\gamma^t},\ \tilde{K}^s_{e,t} = \frac{K^s_{e,t}}{(\gamma_q\gamma)^t}$$

$$\tilde{Y}_t = \frac{Y_t}{\gamma^t},\ \tilde{K}_{b,t} = \frac{K_{b,t}}{\gamma^t},\ \tilde{K}_{e,t} = \frac{K_{e,t}}{(\gamma_q\gamma)^t},\ \tilde{\hat{K}}_{b,t} = \frac{\hat{K}_{b,t}}{\gamma^t},\ \tilde{\hat{K}}_{e,t} = \frac{\hat{K}_{e,t}}{(\gamma_q\gamma)^t}$$

$$\text{Prices}: \tilde{w}^s_t = \frac{W^s_t}{P_t\gamma^t},\ \tilde{w}^u_t = \frac{W^u_t}{P_t\gamma^t},\ r^{K,b}_t = \frac{R^{K,b}_t}{P_t},\ r^{K,e}_t = \frac{R^{K,e}_t}{P_t\gamma^t}$$

$$\tilde{\Phi}_t = \frac{\Phi_t}{\gamma^t},\ \tilde{\Phi}^i_t = \frac{\Phi^i_t}{\gamma^t},\ \pi_t = \frac{P_t}{P_{t-1}},\ \tilde{p}^*_t = \frac{P^*_t}{P_t},\ mc_t = \frac{MC_t}{P_t}$$

$$\tilde{Z}_{1,t} = \frac{Z_{1,t}}{(P_t)^{\theta+1}\gamma^t},\ \tilde{Z}_{2,t} = \frac{Z_{2,t}}{(P_t)^{\theta}\gamma^t}$$

$$\text{Fiscal variables}: \tilde{b}_t = \frac{B_t}{P_tY_t},\ \tilde{G}_t = \frac{G_t}{Y_t},\ \tilde{T}^C_t = \frac{T^C_t}{Y_t},\ \tilde{T}^H_t = \frac{T^H_t}{Y_t}$$

$$\tilde{T}^{K,b}_t = \frac{T^{K,b}_t}{Y_t},\ \tilde{T}^{K,e}_t = \frac{T^{K,e}_t}{Y_t},\ \tilde{S}_t = \frac{S_t}{Y_t},\ \tilde{S}^i_t = \frac{S^i_t}{Y_t}$$

$$\text{Multipliers}: \tilde{\Lambda}^i_t = \gamma^t P_t \Lambda^i_t,\ \tilde{\Psi}^i_{b,t} = \gamma^t \Psi^i_{b,t},\ \tilde{\Psi}^i_{e,t} = \Psi^i_{e,t}$$

A.1.2. Stationary equilibrium conditions. We consider a symmetric equilibrium across firms, where all firms set the same price and produce the same amount of output. Given nonlinear equilibrium conditions, we detrended variables to specify stationary equilibrium conditions. All the notations are the same as before. We now state all the stationary equilibrium equations under incomplete markets.

- Production function:(Let $A_0 = 1$)

$$\tilde{Y}^A_t = \tilde{K}^{\alpha}_{b,t}\left[\mu L^{\sigma}_{u,t} + (1-\mu)\left(\lambda \tilde{K}^{\rho}_{e,t} + (1-\lambda) L^{\rho}_{s,t}\right)^{\frac{\sigma}{\rho}}\right]^{\frac{1-\alpha}{\sigma}}$$

- Aggregate output

$$\tilde{Y}^A_t = \tilde{Y}_t \Xi_t$$

- Cost minimization

$$r_t^{K,b} = \alpha mc_t \frac{\tilde{Y}_t^A}{\tilde{K}_{b,t}}$$

$$r_t^{K,e} = (1-\alpha)\, mc_t \frac{\tilde{Y}_t^A}{\tilde{K}_{e,t}} \left(\frac{(1-\mu)\left(\lambda \tilde{K}_{e,t}^{\rho} + (1-\lambda) L_{s,t}^{\rho}\right)^{\frac{\sigma}{\rho}}}{\mu L_{u,t}^{\sigma} + (1-\mu)\left(\lambda \tilde{K}_{e,t}^{\rho} + (1-\lambda) L_{s,t}^{\rho}\right)^{\frac{\sigma}{\rho}}} \right) \left(\frac{\lambda \tilde{K}_{e,t}^{\rho}}{\lambda \tilde{K}_{e,t}^{\rho} + (1-\lambda) L_{s,t}^{\rho}} \right)$$

$$\tilde{w}_t^u = (1-\alpha)\, mc_t \frac{\tilde{Y}_t^A}{L_{u,t}} \left(\frac{\mu L_{u,t}^{\sigma}}{\mu L_{u,t}^{\sigma} + (1-\mu)\left(\lambda \tilde{K}_{e,t}^{\rho} + (1-\lambda) L_{s,t}^{\rho}\right)^{\frac{\sigma}{\rho}}} \right)$$

$$\tilde{w}_t^s = (1-\alpha)\, mc_t \frac{\tilde{Y}_t^A}{L_{s,t}} \left(\frac{(1-\mu)\left(\lambda \tilde{K}_{e,t}^{\rho} + (1-\lambda) L_{s,t}^{\rho}\right)^{\frac{\sigma}{\rho}}}{\mu L_{u,t}^{\sigma} + (1-\mu)\left(\lambda \tilde{K}_{e,t}^{\rho} + (1-\lambda) L_{s,t}^{\rho}\right)^{\frac{\sigma}{\rho}}} \right) \left(\frac{(1-\lambda) L_{s,t}^{\rho}}{\lambda \tilde{K}_{e,t}^{\rho} + (1-\lambda) L_{s,t}^{\rho}} \right)$$

- Skill-premium

$$\frac{\tilde{w}_t^s}{\tilde{w}_t^u} = \frac{(1-\mu)(1-\lambda)}{\mu} \left(\lambda \left(\frac{\tilde{K}_{e,t}}{L_{s,t}} \right)^{\rho} + (1-\lambda) \right)^{\frac{\sigma-\rho}{\rho}} \left(\frac{L_{u,t}}{L_{s,t}} \right)^{1-\sigma}$$

- Firms' maximization:

$$\tilde{Z}_{1,t} = mc_t \tilde{Y}_t + \alpha_p \beta \left((\pi_t)^{\gamma_P} \bar{\pi}^{(1-\gamma_P)} \right)^{-\theta} E_t \left\{ \frac{\tilde{\Lambda}_{t+1}}{\tilde{\Lambda}_t} \tilde{Z}_{1,t+1} (\pi_{t+1})^{\theta} \right\} \tag{A.1}$$

$$\tilde{Z}_{2,t} = \tilde{Y}_t + \alpha_p \beta \left((\pi_t)^{\gamma_P} \bar{\pi}^{(1-\gamma_P)} \right)^{1-\theta} E_t \left\{ \frac{\tilde{\Lambda}_{t+1}}{\tilde{\Lambda}_t} \tilde{Z}_{2,t+1} (\pi_{t+1})^{\theta-1} \right\}$$

- Price dispersion

$$\Xi_t = (1-\alpha_P) \left(\tilde{p}_t^* \right)^{-\theta} + \alpha_P \pi_t^{\theta} \left(\pi_{t-1}^{\gamma_P} \bar{\pi}^{1-\gamma_P} \right)^{-\theta} \Xi_{t-1} \tag{A.2}$$

  where

$$\tilde{p}_t^* = \frac{\theta}{\theta - 1} \frac{\tilde{Z}_{1,t}}{\tilde{Z}_{2,t}}.$$

- Aggregate price index

$$\pi_t^{1-\theta} = (1-\alpha_P) \left(\pi_t \tilde{p}_t^* \right)^{1-\theta} + \alpha_P \left(\pi_{t-1}^{\gamma_P} \bar{\pi}^{1-\gamma_P} \right)^{1-\theta}$$

- Profit

$$\tilde{\Phi}_t = \tilde{Y}_t - \tilde{w}_t^u L_{u,t} - \tilde{w}_t^s L_{s,t} - r_t^{K,b} \tilde{K}_{b,t} - r_t^{K,e} \tilde{K}_{e,t}$$

- Hand-to-mouth households

$$\tilde{w}_t^u \frac{1-\tau_t^H}{1+\tau_t^C} = \bar{\omega}^u \tilde{C}_t^u \left(H_t^u \right)^{\varphi}$$

$$\left(1+\tau_t^C\right) \tilde{C}_t^u = \left(1-\tau_t^H\right) \tilde{w}_t^u H_t^u + \tilde{\Phi}_t^u + \tilde{S}_t^u \tilde{Y}_t$$

- Skilled households

– Marginal utilities:

$$\tilde{\Lambda}_t^s\left(1+\tau_t^C\right)=\frac{1}{\tilde{C}_t^s}$$
$$\tilde{\Lambda}_t^s\left(1-\tau_t^H\right)\tilde{w}_t^s=\tilde{\omega}^s\left(H_t^s\right)^{\varphi}$$

– Capacity utilization costs

$$\mathscr{A}_b\left(u_{b,t}\right)=\chi_{b,1}\left(u_{b,t}-1\right)+\frac{\chi_{b,2}^2}{2}\left(u_{b,t}-1\right)^2$$

$$\mathscr{A}_e\left(u_{e,t}\right)=\chi_{e,1}\left(u_{e,t}-1\right)+\frac{\chi_{e,2}^2}{2}\left(u_{e,t}-1\right)^2$$

– FOCs and Capital Accumulation

$$\tilde{w}_t^s\frac{1-\tau_t^H}{1+\tau_t^C}=\tilde{\omega}^s\tilde{C}_t^s\left(H_t^s\right)^{\varphi}$$

$$\tilde{\Lambda}_t^s=\frac{\beta}{\gamma}R_tE_t\left\{\tilde{\Lambda}_{t+1}^s\frac{1}{\pi_{t+1}}\right\} \tag{A.3}$$

$$\tilde{\Psi}_{b,t}^s=\frac{\beta}{\gamma}E_t\left\{\left(1-d_b\right)\tilde{\Psi}_{b,t+1}^s+\left[\left(1-\tau_{t+1}^K\right)r_{t+1}^{K,b}u_{b,t+1}-\left(1-\lambda_b\tau_{t+1}^K\right)\mathscr{A}_b\left(u_{b,t+1}\right)\right]\tilde{\Lambda}_{t+1}^s\right\} \tag{A.4}$$

$$\begin{aligned}\left(1-\lambda_b\tau_t^K\right)\tilde{\Lambda}_t^s=\tilde{\Psi}_{b,t}^s&\left(1-\mathscr{S}\left(\frac{\tilde{I}_{b,t}^s}{\tilde{I}_{b,t-1}^s}\gamma\right)-\mathscr{S}'\left(\frac{\tilde{I}_{b,t}^s}{\tilde{I}_{b,t-1}^s}\gamma\right)\frac{\tilde{I}_{b,t}^s}{\tilde{I}_{b,t-1}^s}\gamma\right)\\&+\frac{\beta}{\gamma}E_t\left\{\tilde{\Psi}_{b,t+1}^s\left(\frac{\tilde{I}_{b,t+1}^s}{\tilde{I}_{b,t}^s}\gamma\right)^2\mathscr{S}'\left(\frac{\tilde{I}_{b,t+1}^s}{\tilde{I}_{b,t}^s}\gamma\right)\right\}\end{aligned}$$

$$\tilde{\Psi}_{e,t}^s=\beta E_t\left\{\left(1-d_e\right)\tilde{\Psi}_{e,t+1}^s+\left[\left(1-\tau_{t+1}^K\right)r_{t+1}^{K,e}u_{e,t+1}-\frac{1}{q_0}\left(1-\lambda_e\tau_{t+1}^K\right)\mathscr{A}_e\left(u_{e,t+1}\right)\right]\tilde{\Lambda}_{t+1}^s\right\} \tag{A.5}$$

$$\begin{aligned}\left(1-\lambda_e\tau_t^K\right)\frac{1}{q_0}\tilde{\Lambda}_t^s=\tilde{\Psi}_{e,t}^s&\left(1-\mathscr{S}\left(\frac{\tilde{I}_{e,t}^s}{\tilde{I}_{e,t-1}^s}\gamma\right)-\mathscr{S}'\left(\frac{\tilde{I}_{e,t}^s}{\tilde{I}_{e,t-1}^s}\gamma\right)\frac{\tilde{I}_{e,t}^s}{\tilde{I}_{e,t-1}^s}\gamma\right)\\&+\frac{\beta}{\gamma}E_t\left\{\tilde{\Psi}_{e,t+1}^s\left(\frac{\tilde{I}_{e,t+1}^s}{\tilde{I}_{e,t}^s}\gamma\right)^2\mathscr{S}'\left(\frac{\tilde{I}_{e,t+1}^s}{\tilde{I}_{e,t}^s}\gamma\right)\right\}\end{aligned}$$

$$\gamma\tilde{\tilde{K}}_{b,t+1}^s=\left(1-d_b\right)\tilde{\tilde{K}}_{b,t}^s+\left(1-\mathscr{S}\left(\frac{\tilde{I}_{b,t}^s}{\tilde{I}_{b,t-1}^s}\gamma\right)\right)\tilde{I}_{b,t}^s$$

$$\tilde{\tilde{K}}_{e,t+1}^s=\left(1-d_e\right)\tilde{\tilde{K}}_{e,t}^s+\left(1-\mathscr{S}\left(\frac{\tilde{I}_{e,t}^s}{\tilde{I}_{e,t-1}^s}\gamma\right)\right)\tilde{I}_{e,t}^sq_0$$

$$\left(1-\tau_t^K\right)r_t^{K,b}=\left(1-\lambda_b\tau_t^K\right)\mathscr{A}_b'\left(u_{b,t}\right)$$

$$\left(1-\tau_t^K\right)r_t^{K,e}=\frac{1}{q_0}\left(1-\lambda_e\tau_t^K\right)\mathscr{A}_e'\left(u_{e,t}\right)$$

- Resource constraint

$$\begin{aligned}\left(1-\tilde{G}_t\right)\tilde{Y}_t&=N^s\left(\tilde{C}_t^s+\tilde{I}_{b,t}^s+\tilde{I}_{e,t}^s+\mathscr{A}_b\left(u_{b,t}\right)\tilde{\tilde{K}}_{b,t}^s+\frac{1}{q_0}\mathscr{A}_e\left(u_{e,t}\right)\tilde{\tilde{K}}_{e,t}^s\right)+N^u\tilde{C}_t^u\\&=\tilde{C}_t+\tilde{I}_{b,t}+\tilde{I}_{e,t}+\mathscr{A}_b\left(u_{b,t}\right)\tilde{\tilde{K}}_{b,t}+\frac{1}{q_0}\mathscr{A}_e\left(u_{e,t}\right)\tilde{\tilde{K}}_{e,t}\end{aligned} \tag{A.6}$$

- Market clearing

$$\tilde{C}_t = N^s \tilde{C}_t^s + N^u \tilde{C}_t^u$$

$$L_{u,t} = N^u H_t^u,\ L_{s,t} = N^s H_t^s$$
$$\tilde{K}_{b,t} = N^s \tilde{K}_{b,t}^s,\ \tilde{K}_{e,t} = N^s \tilde{K}_{e,t}^s$$
$$\tilde{I}_{b,t} = N^s \tilde{I}_{b,t}^s,\ \tilde{I}_{e,t} = N^s \tilde{I}_{e,t}^s$$
$$\tilde{K}_{b,t}^s = u_{b,t}^s \tilde{\tilde{K}}_{b,t}^s,\ \tilde{K}_{e,t}^s = u_{e,t}^s \tilde{\tilde{K}}_{e,t}^s$$

- Government budget constraint

$$\tilde{b}_t + \tilde{T}_t^C + \tilde{T}_t^H + \tilde{T}_t^{K,b} + \tilde{T}_t^{K,e} = R_{t-1}\tilde{b}_{t-1}\frac{1}{\pi_t \gamma}\frac{\tilde{Y}_{t-1}}{\tilde{Y}_t} + \tilde{G}_t + \tilde{S}_t$$

where

$$\tilde{T}_t^C = \tau^C \frac{\tilde{C}_t}{\tilde{Y}_t},\ \tilde{T}_t^H = \tau_t^H \sum_{i \in s,u}\left(\tilde{w}_t^i \frac{L_{i,t}}{\tilde{Y}_t}\right),$$
$$\tilde{T}_t^{K,b} = \tau_t^K \left(r_t^{K,b}\frac{\tilde{\tilde{K}}_{b,t}}{\tilde{Y}_t}u_{b,t} - \lambda_b\left(\frac{\tilde{I}_{b,t}}{\tilde{Y}_t} + \mathscr{A}_b\left(u_{b,t}\right)\frac{\tilde{\tilde{K}}_{b,t}}{\tilde{Y}_t}\right)\right),$$
$$\tilde{T}_t^{K,e} = \tau_t^K \left(r_t^{K,e}\frac{\tilde{\tilde{K}}_{e,t}}{\tilde{Y}_t}u_{e,t} - \lambda_e\left(\frac{\tilde{I}_{e,t}}{\tilde{Y}_t} + \frac{1}{q_0}\mathscr{A}_e\left(u_{e,t}\right)\frac{\tilde{\tilde{K}}_{e,t}}{\tilde{Y}_t}\right)\right)$$

- Fiscal Policy Rules:

$$\begin{aligned}
\frac{S_t}{Y_t} - \frac{\bar{S}_{new}}{\bar{Y}_{new}} =& \rho_1^S\left(\frac{S_{t-1}}{Y_{t-1}} - \frac{\bar{S}_{new}}{\bar{Y}_{new}}\right) + \rho_2^S\left(\frac{S_{t-2}}{Y_{t-2}} - \frac{\bar{S}_{new}}{\bar{Y}_{new}}\right) \\
&+ \left(1 - \rho_1^S - \rho_2^S\right)\left\{\psi_B^S\left(\frac{B_{t-1}}{P_{t-1}Y_{t-1}} - \frac{\overline{B}}{PY}\right) + \psi_{\Delta y}^S\left(\frac{Y_t}{Y_{t-1}}\right) + \psi_x^S\left(\frac{Y_t}{Y_t^n}\right)\right\}, \\
\tau_t^H - \bar{\tau}_{new}^H =& \rho_1^H\left(\tau_{t-1}^H - \bar{\tau}_{new}^H\right) + \rho_2^H\left(\tau_{t-2}^H - \bar{\tau}_{new}^H\right) \\
&+ \left(1 - \rho_1^H - \rho_2^H\right)\left\{\psi_B^H\left(\frac{B_{t-1}}{P_{t-1}Y_{t-1}} - \frac{\overline{B}}{PY}\right) + \psi_{\Delta y}^H\left(\frac{Y_t}{Y_{t-1}}\right) + \psi_x^H\left(\frac{Y_t}{Y_t^n}\right)\right\}, \\
\tau_t^C - \bar{\tau}_{new}^C =& \rho_1^C\left(\tau_{t-1}^C - \bar{\tau}_{new}^C\right) + \rho_2^C\left(\tau_{t-2}^C - \bar{\tau}_{new}^C\right) = \\
&+ \left(1 - \rho_1^C - \rho_2^C\right)\left\{\psi_B^C\left(\frac{B_{t-1}}{P_{t-1}Y_{t-1}} - \frac{\overline{B}}{PY}\right) + \psi_{\Delta y}^C\left(\frac{Y_t}{Y_{t-1}}\right) + \psi_x^C\left(\frac{Y_t}{Y_t^n}\right)\right\}
\end{aligned}$$

$$\tau_t^K = \begin{cases} \bar{\tau}^K & \text{if } t = 0 \\ \bar{\tau}_{New}^K & \text{if } t > 0 \end{cases}$$
$$\tilde{G}_t = \bar{\tilde{G}}$$

- Monetary policy

$$\frac{R_t}{\bar{R}} = \left[\frac{R_{t-1}}{\bar{R}}\right]^{\rho_1^R}\left[\frac{R_{t-2}}{\bar{R}}\right]^{\rho_2^R}\left[\left(\frac{\pi_t}{\bar{\pi}}\right)^{\phi_\pi}\left(\frac{Y_t}{Y_{t-1}}\right)^{\phi_{\Delta y}}\left(\frac{Y_t}{Y_t^n}\right)^{\phi_x}\right]^{\left(1-\rho_1^R-\rho_2^R\right)}$$

- Government debt to GDP (or transfers):

$$\tilde{S}_t = \bar{\tilde{S}} \text{ if adjusting labor tax rate}$$

A.2. Steady state

We now derive the steady-state equations by imposing stationarity on the equilibrium conditions above. In steady state, investment adjustment costs vanish ($\mathscr{S}(\gamma) = \mathscr{S}'(\gamma) = 0$), capacity utilization is at its steady-state level ($u_b = u_e = 1$), price dispersion equals unity ($\bar{\Xi} = 1$), and the markup is at its non-stochastic level. These conditions allow us to solve for steady-state ratios—such as capital-to-hours and consumption-to-hours—as functions of parameters and tax rates, which is the basis for the analytical results in Section 3.

Recall that in steady-state, $\mathscr{S}\left(\gamma\right) = \mathscr{S}'\left(\gamma\right) = 0$:

From Equation (A.1) and Equation (A.2), we get

$$\bar{mc} = \frac{\theta - 1}{\theta}.$$

From skilled workers' optimal capital investment decisions, we get

$$\bar{r}^{K,b} = \left(\frac{\gamma}{\beta} - (1 - d_b)\right) \frac{1 - \lambda_b \bar{\tau}^K}{1 - \bar{\tau}^K}$$

$$\bar{r}^{K,e} = \frac{1}{q_0}\left(\frac{1}{\beta} - (1 - d_e)\right) \frac{1 - \lambda_e \bar{\tau}^K}{1 - \bar{\tau}^K}$$

From the production function, we get

$$\frac{\bar{\tilde{Y}}^A}{\bar{L}_s} = \frac{\bar{\tilde{Y}}}{\bar{L}_s} = \left(\frac{\bar{\tilde{K}}_b}{\bar{L}_s}\right)^{\alpha} \left[\mu\left(\frac{\bar{L}_u}{\bar{L}_s}\right)^{\sigma} + (1-\mu)\left(\lambda\left(\frac{\bar{\tilde{K}}_e}{\bar{L}_s}\right)^{\rho} + (1-\lambda)\right)^{\frac{\sigma}{\rho}}\right]^{\frac{1-\alpha}{\sigma}}$$

and

$$\bar{\Xi} = 1.$$

From firms' optimality conditions, we get

$$\bar{\tilde{w}}^s = (1-\lambda)(1-\mu)(1-\alpha)\,\bar{mc}\left(\frac{\bar{r}^{K,b}}{\alpha \bar{mc}}\right)^{1-\frac{\sigma}{1-\alpha}} \left(\frac{\bar{\tilde{K}}_b}{\bar{L}_s}\right)^{1-\sigma} \left(\lambda\left(\frac{\bar{\tilde{K}}_e}{\bar{L}_s}\right)^{\rho} + (1-\lambda)\right)^{\frac{\sigma}{\rho}-1}$$

$$\bar{\tilde{w}}^u \left(\frac{\bar{L}_u}{\bar{L}_s}\right)^{1-\sigma} = \mu(1-\alpha)\,\bar{mc}\left(\frac{\bar{r}^{K,b}}{\alpha \bar{mc}}\right)^{\frac{1-\alpha-\sigma}{1-\alpha}} \left(\frac{\bar{\tilde{K}}_b}{\bar{L}_s}\right)^{1-\sigma}$$

$$\bar{r}^{K,e}\left(\frac{\bar{\tilde{K}}_e}{\bar{L}_s}\right)^{1-\rho} = \lambda(1-\mu)(1-\alpha)\,\bar{mc}\left(\frac{\bar{r}^{K,b}}{\alpha \bar{mc}}\right)^{1-\frac{\sigma}{1-\alpha}} \left(\frac{\bar{\tilde{K}}_b}{\bar{L}_s}\right)^{1-\sigma} \left(\lambda\left(\frac{\bar{\tilde{K}}_e}{\bar{L}_s}\right)^{\rho} + (1-\lambda)\right)^{\frac{\sigma}{\rho}-1}$$

$$\left(\frac{\bar{r}^{K,b}}{\alpha \bar{mc}}\right) = \left(\frac{\bar{\tilde{K}}_b}{\bar{L}_s}\right)^{\alpha-1} \left[\mu\left(\frac{\bar{L}_u}{\bar{L}_s}\right)^{\sigma} + (1-\mu)\left(\lambda\left(\frac{\bar{\tilde{K}}_e}{\bar{L}_s}\right)^{\rho} + (1-\lambda)\right)^{\frac{\sigma}{\rho}}\right]^{\frac{1-\alpha}{\sigma}}$$

Also, from skilled-household's budget constraint, we have budget constraint

$$\left(1 + \bar{\tau}^C\right)\frac{\bar{\tilde{C}}^s}{\bar{\tilde{Y}}} = \left(1 - \bar{\tau}^H\right)\bar{\tilde{w}}^s \frac{\bar{H}^s}{\bar{\tilde{Y}}} + \left(\left(1 - \bar{\tau}^K\right)\bar{r}^{K,b} - \left(1 - \lambda_b \bar{\tau}^K\right)\left(\gamma - (1 - d_b)\right)\right)\frac{\bar{\tilde{K}}_b^s}{\bar{\tilde{Y}}}$$

$$+\left(\left(1-\bar{\tau}^K\right)\bar{r}^{K,e}-\left(1-\lambda_e\bar{\tau}^K\right)\frac{d_e}{q_0}\right)\frac{\bar{\bar{K}}_e^s}{\bar{\bar{Y}}}$$
$$+\left(\frac{1}{\beta}-1\right)\bar{\bar{b}}^s+\frac{\chi_\Phi^s}{N^s}\frac{\bar{\bar{\Phi}}}{\bar{\bar{Y}}}+\frac{\chi_S^s}{N^s}\bar{\bar{S}}$$

where the profit is

$$\frac{\bar{\bar{\Phi}}}{\bar{\bar{Y}}}=1-\bar{\tilde{w}}^u\frac{\bar{L}_u}{\bar{\bar{Y}}}-\bar{\tilde{w}}^s\frac{\bar{L}_s}{\bar{\bar{Y}}}-\bar{r}^{K,b}\frac{\bar{\bar{K}}_b}{\bar{\bar{Y}}}-\bar{r}^{K,e}\frac{\bar{\bar{K}}_e}{\bar{\bar{Y}}}$$

and the transfer is

$$\bar{\bar{S}}=\bar{\tau}^C\frac{\bar{\bar{C}}}{\bar{\bar{Y}}}+\bar{\tau}^H\left(\sum_{i\in\{s,u\}}\bar{\tilde{w}}^i\frac{\bar{L}_i}{\bar{\bar{Y}}}\right)+\bar{\tau}^K\left(\bar{r}^{K,b}\frac{\bar{\bar{K}}_b}{\bar{\bar{Y}}}-\lambda_b\frac{\bar{\bar{I}}_b}{\bar{\bar{Y}}}\right)+\bar{\tau}^K\left(\bar{r}^{K,e}\frac{\bar{\bar{K}}_e}{\bar{\bar{Y}}}-\lambda_e\frac{\bar{\bar{I}}_e}{\bar{\bar{Y}}}\right)-\left(\left(\frac{1}{\beta}-1\right)\bar{\bar{b}}+\bar{\bar{G}}\right).$$

From Equation (A.4) and Equation (A.5) for both types of households, we get

$$\left(\gamma-(1-d_b)\right)\frac{\bar{\bar{K}}_b^s}{\bar{H}^s}=\frac{\bar{\bar{I}}_b^s}{\bar{H}^s}$$
$$d_e\frac{\bar{\bar{K}}_e^s}{\bar{H}^s}=\frac{\bar{\bar{I}}_e^s}{\bar{H}^s}q_0$$
$$\left(\gamma-(1-d_b)\right)\frac{\bar{\bar{K}}_b^u}{\bar{H}^u}=\frac{\bar{\bar{I}}_b^u}{\bar{H}^u}$$
$$d_e\frac{\bar{\bar{K}}_e^u}{\bar{H}^u}=\frac{\bar{\bar{I}}_e^u}{\bar{H}^u}q_0$$

From household's intra-temporal Euler equations, we have

$$\bar{\tilde{w}}^u\frac{1-\bar{\tau}^H}{1+\bar{\tau}^C}=\bar{\omega}^u\bar{\tilde{C}}^u\left(\bar{H}^u\right)^\varphi$$
$$\left(1+\bar{\tau}^C\right)\bar{\tilde{C}}^u=\left(1-\bar{\tau}^H\right)\bar{\tilde{w}}^u\bar{H}^u+\bar{\tilde{\Phi}}^u+\bar{\tilde{S}}^u\bar{\bar{Y}}$$
$$\frac{1-\bar{\tau}^H}{1+\bar{\tau}^C}\bar{\tilde{w}}^s=\bar{\omega}^s\bar{\tilde{C}}^s\left(\bar{H}^s\right)^\varphi$$
$$\Lambda_{s,u}=\frac{\bar{\tilde{\Lambda}}^s}{\bar{\tilde{\Lambda}}^u}=\frac{\bar{\tilde{C}}^u}{\bar{\tilde{C}}^s}$$
$$\bar{\tilde{C}}^s=\left(\frac{1}{N^u\Lambda_{s,u}+N^s}\right)\bar{\tilde{C}}$$
$$\bar{\tilde{C}}^u=\left(\frac{\Lambda_{s,u}}{N^u\Lambda_{s,u}+N^s}\right)\bar{\tilde{C}}$$

From the market clearing conditions, we have

$$\frac{\bar{\bar{K}}_b}{\bar{L}_s}=\frac{\bar{\bar{K}}_b^s}{\bar{H}^s}+\frac{\bar{L}_u}{\bar{L}_s}\frac{\bar{\bar{K}}_b^u}{\bar{H}^u}$$
$$\frac{\bar{\bar{K}}_e}{\bar{L}_s}=\frac{\bar{\bar{K}}_e^s}{\bar{H}^s}+\frac{\bar{L}_u}{\bar{L}_s}\frac{\bar{\bar{K}}_e^u}{\bar{H}^u}$$

From Equation (A.6), we get

$$\frac{\bar{\tilde{C}}}{\bar{L}_s}+\left(\gamma-(1-d_b)\right)\frac{\bar{\bar{K}}_b}{\bar{L}_s}+\frac{d_e}{q_0}\frac{\bar{\bar{K}}_e}{\bar{L}_s}=\left(1-\bar{G}\right)\frac{\bar{\bar{Y}}}{L_s}$$

The nominal interest rate is obtained from Euler Equation (A.3)

$$\bar{R} = \frac{\gamma\bar{\pi}}{\beta}.$$

We fix steady-state hours for skilled labor $\bar{H}^s = 0.33$, following the standard RBC convention, and set $\bar{H}^u = \bar{H}^s/1.07 = 0.308$, so that the ratio $\bar{H}^s/\bar{H}^u = 1.07$ matches the average usual weekly hours ratio of BA+ to high school diploma workers in the CPS MORG (2015–2017).

A.3. BFM monetary accommodation extension

This subsection presents the additional equilibrium conditions for the funded/unfunded decomposition of Bianchi et al. (2023), as described in Section 4. The BFM extension introduces a *shadow economy* that operates under a passive monetary/active fiscal (PMAF) regime. The actual economy's policy rules are then modified to respond to *funded* components—defined as deviations of the actual economy from the shadow economy. All private-sector equilibrium conditions (production, household optimization, price setting) in Sections A.1 remain unchanged for both the actual and shadow economies. The modifications are confined to the policy block.

A.3.1. Shadow economy policy rules. The shadow economy receives the same capital tax shock τ_t^K but operates under PMAF. Its monetary policy rule is

$$\frac{R_t^{sh}}{\bar{R}} = \left[\frac{R_{t-1}^{sh}}{\bar{R}}\right]^{\rho_1^R}\left[\frac{R_{t-2}^{sh}}{\bar{R}}\right]^{\rho_2^R}\left[\left(\frac{\pi_t^{sh}}{\bar{\pi}}\right)^{\phi_\pi^F}\right]^{\left(1-\rho_1^R-\rho_2^R\right)}, \tag{A.7}$$

where $\phi_\pi^F < 1$ violates the Taylor principle. With $\phi_\pi^F = 0$, the shadow central bank pegs the nominal interest rate (up to smoothing), representing maximal monetary accommodation. The output gap and output growth terms are omitted from the shadow Taylor rule, consistent with a purely passive monetary stance.

The shadow fiscal rule for the labor tax rate is

$$\tau_t^{H,sh} - \bar{\tau}_{new}^H = \rho_1^F\left(\tau_{t-1}^{H,sh} - \bar{\tau}_{new}^H\right) + \rho_2^F\left(\tau_{t-2}^{H,sh} - \bar{\tau}_{new}^H\right) + \left(1-\rho_1^F-\rho_2^F\right)\left(\psi_B^F\tilde{b}_{t-1}^{sh} + \psi_{\Delta y}^F\frac{Y_t^{sh} - Y_{t-1}^{sh}}{Y_{t-1}^{sh}}\right), \tag{A.8}$$

where the key distinction from the baseline fiscal rule is the weak debt response $\psi_B^F \approx 0$. Under the PMAF regime, fiscal policy does not aggressively stabilize debt; instead, government solvency is maintained through adjustments in the price level (inflation surprises reduce the real value of outstanding debt).

The shadow government budget constraint, consumption tax rule, government spending rule, and transfer rule are analogous to those in Section A.1, with all variables replaced by their shadow counterparts (superscript sh) and the fiscal rule responding to shadow debt $\tilde{b}_t^{sh}$.

A.3.2. Actual economy policy rules. In the BFM decomposition, the actual economy's policy rules respond to funded components. The Taylor rule becomes

$$\frac{R_t}{\bar{R}} = \left[\frac{R_{t-1}}{\bar{R}}\right]^{\rho_1^R} \left[\frac{R_{t-2}}{\bar{R}}\right]^{\rho_2^R} \left[\left(\frac{\pi_t/\pi_t^{sh}}{\bar{\pi}/\bar{\pi}}\right)^{\phi_\pi} \left(\frac{\pi_t^{sh}}{\bar{\pi}}\right)^{\phi_\pi^F} \left(\frac{Y_t}{Y_{t-1}}\right)^{\phi_{\Delta y}} \left(\frac{Y_t}{Y_t^n}\right)^{\phi_x}\right]^{(1-\rho_1^R-\rho_2^R)}, \tag{A.9}$$

where funded inflation $\pi_t^{funded} \equiv \pi_t/\pi_t^{sh}$ receives the active response $\phi_\pi > 1$, while unfunded (shadow) inflation π_t^{sh} receives only the passive response $\phi_\pi^F < 1$. This ensures that the central bank accommodates fiscal inflation (the component driven by PMAF dynamics) while responding actively to demand-driven inflation.

The labor tax rule responds to funded debt rather than total debt:

$$\tau_t^H - \bar{\tau}_{new}^H = \rho_1^S\left(\tau_{t-1}^H - \bar{\tau}_{new}^H\right) + \rho_2^S\left(\tau_{t-2}^H - \bar{\tau}_{new}^H\right) + \left(1-\rho_1^S-\rho_2^S\right)\left(\psi_B^S\left(\tilde{b}_{t-1} - \tilde{b}_{t-1}^{sh}\right) + \psi_{\Delta y}^S \frac{Y_t - Y_{t-1}}{Y_{t-1}}\right), \tag{A.10}$$

where $\tilde{b}_t^{funded} \equiv \tilde{b}_t - \tilde{b}_t^{sh}$ is the funded component of debt. The consumption tax rule and government spending rule are similarly modified to respond to funded debt $\tilde{b}_t - \tilde{b}_t^{sh}$ rather than total debt $\tilde{b}_t$.

A.3.3. Equilibrium. The BFM equilibrium is defined as a set of allocations and prices for the actual economy, the shadow economy, and the flexible-price economy that satisfy:

1. All private-sector equilibrium conditions from Section A.1 for each of the three economies;
2. The shadow economy's PMAF policy rules, Equation (A.7) and Equation (A.8), and its government budget constraint;
3. The actual economy's BFM policy rules, Equation (A.9) and Equation (A.10), and its government budget constraint;
4. The flexible-price economy conditions used for the output gap Y_t/Y_t^n;
5. Both actual and shadow economies converge to the same terminal steady state.

The combined system has 131 equations (48 actual, 48 shadow, 35 flexible-price). The Blanchard-Kahn conditions are satisfied with $\phi_\pi > 1.0$ for the actual economy's response to funded inflation. Table 4 in the main text reports the shadow economy parameters: $\phi_\pi^F = 0$, $\psi_B^F = 0.001$, $\rho_1^F = 0.785$, $\rho_2^F = 0.107$, and $\psi_{\Delta y}^F = 1.821$.

B Additional Analytical Results and Proofs of Propositions

This appendix contains the analytical derivations underlying the propositions in the main text. We first present steady-state equations for a simplified (nested Cobb-Douglas) version of the

model, which allow us to derive closed-form comparative statics results with respect to the capital tax rate. We then prove Propositions B.1 and 1, which characterize how the long-run effects of capital tax cuts differ across financing schemes. Finally, we derive the analytical expression for the effect of capital-skill complementarity on the skill premium response to capital tax changes.

B.1. Steady-state equilibrium equations for a nested version of the model

We assume $\mu = 0$, $\alpha = 0$, and $\rho \to 0$ to get a nested version of the model with a Cobb-Douglas production function. In this case, to have balanced growth, the growth rate of output is the same with the growth rate of technology, $\gamma = \bar{a}$, and the growth rate of relative price (γ_q) is 1. Let $q_0 = 1$. Also, let the fraction of skilled workers $N^S = 1$ and set $\chi^s_\Phi = 1$ and $\chi^s_S = 1$ for profit and transfers distributions. Then, in this economy, we have one type of capital $K_{e,t}$ and one type of labor $L_{s,t}$. We derive steady-state equilibrium equations for this nested version of the model and drop subscripts e and s.

- Marginal cost

$$\bar{mc} = \frac{\theta - 1}{\theta}.$$

- Capital rental rate

$$\bar{r}^K = \frac{\frac{\bar{a}}{\beta} - (1-d)}{1 - \bar{\tau}^K} \tag{B.1}$$

- Production function

$$\frac{\bar{\tilde{Y}}}{\bar{H}} = \left(\frac{\bar{\tilde{K}}}{\bar{H}}\right)^{\lambda} \tag{B.2}$$

- Wages and capital-to-labor ratio

$$\frac{\bar{\tilde{K}}}{\bar{H}} = \left(\frac{\bar{r}^K}{\lambda \bar{mc}}\right)^{\frac{1}{\lambda - 1}} \tag{B.3}$$

$$\begin{aligned} \bar{\tilde{w}} &= (1-\lambda)\,\bar{mc}\left(\frac{\bar{\tilde{K}}}{\bar{H}}\right)^{\lambda} \\ &= (1-\lambda)\,(\lambda)^{\frac{\lambda}{1-\lambda}}\,(\bar{mc})^{\frac{1}{1-\lambda}}\left(\bar{r}^K\right)^{\frac{\lambda}{\lambda-1}} \end{aligned} \tag{B.4}$$

- Resource constraint

$$\frac{\bar{\tilde{C}}}{\bar{H}} = \left(1 - \bar{\tilde{G}}\right)\frac{\bar{\tilde{Y}}}{\bar{H}} - \frac{\bar{\tilde{I}}}{\bar{H}}. \tag{B.5}$$

- Profit

$$\frac{\bar{\tilde{\Phi}}}{\bar{\tilde{Y}}} = 1 - \bar{\tilde{w}}\frac{\bar{H}}{\bar{\tilde{Y}}} - \bar{r}^K\frac{\bar{\tilde{K}}}{\bar{\tilde{Y}}}$$

- Transfer

$$\bar{\tilde{S}} = \left(1 - \frac{\bar{R}}{\bar{\pi}\bar{a}}\right)\bar{\tilde{b}} - \bar{\tilde{G}} + \bar{\tilde{T}}^C + \bar{\tilde{T}}^H + \bar{\tilde{T}}^K.$$

- The consumption, labor income and capital income tax rates are respectively given as:

$$\bar{\tau}^C = \frac{\bar{\bar{T}}^C}{\frac{\bar{\bar{C}}}{\bar{\bar{Y}}}},\ \bar{\tau}^H = \frac{1}{\bar{\bar{w}}}\frac{\bar{\bar{T}}^H}{\frac{\bar{\bar{H}}}{\bar{\bar{Y}}}},\ \bar{\tau}^K = \frac{1}{\bar{r}^K}\frac{\bar{\bar{T}}^K}{\frac{\bar{\bar{K}}}{\bar{\bar{Y}}}}.$$

- Intra-temporal Euler equation

$$\bar{H} = \left(\frac{1}{\bar{\omega}\left(\frac{1+\bar{\tau}^C}{1-\bar{\tau}^H}\frac{\bar{\bar{C}}}{\bar{H}}\frac{1}{\bar{\bar{w}}}\right)}\right)^{\frac{1}{1+\varphi}}. \tag{B.6}$$

- Investment

$$\frac{\bar{\bar{I}}}{\bar{H}} = \frac{\bar{\bar{K}}}{\bar{H}}\left(\bar{a}-(1-d)\right). \tag{B.7}$$

- Nominal interest rate

$$\bar{R} = \frac{\bar{a}\bar{\pi}}{\beta}.$$

B.2. Analytical results with capital-skill complementarity

We now derive the effect of a capital tax change on the skill premium in the full model with capital-skill complementarity (i.e., without the Cobb-Douglas nesting restrictions above). The key result is that a capital tax cut raises the skill premium when $\sigma > \rho$ (i.e., when equipment capital and skilled labor are more complementary than equipment capital and unskilled labor), which is the empirically relevant case (Krusell et al., 2000).

The skill premium can be expressed as follows:

$$\begin{aligned}\frac{\bar{\tilde{w}}^s}{\bar{\tilde{w}}^u} &= \frac{(1-\lambda)(1-\mu)}{\mu}\frac{\left(\lambda\left(\frac{\bar{\bar{K}}_e}{\bar{\bar{L}}_s}\right)^\rho + (1-\lambda)\right)^{\frac{\sigma}{\rho}-1}}{\left(\frac{\bar{\bar{L}}_u}{\bar{\bar{L}}_s}\right)^{\sigma-1}} \\ &= \frac{(1-\lambda)(1-\mu)}{\mu}\chi_c^{\frac{1-\sigma}{\sigma}}(F)^{\frac{\sigma-\rho}{\rho}\left(\frac{\varphi}{1-\sigma+\varphi}\right)}\end{aligned}$$

where $\chi_c = \left(\frac{(1-\lambda)(1-\mu)}{\mu}\frac{\tilde{\Lambda}_{s,u}}{\frac{\bar{\tilde{\omega}}^s}{\bar{\tilde{\omega}}^u}\left(\frac{N^u}{N^s}\right)^\varphi}\right)^{\frac{\sigma}{\sigma-\varphi-1}} > 0$ and $F\left(\frac{\bar{\bar{K}}_e}{\bar{\bar{L}}_s}\right) = \lambda\left(\frac{\bar{\bar{K}}_e}{\bar{\bar{L}}_s}\right)^\rho + (1-\lambda) > 0$. Then,

$$\begin{aligned}\frac{\partial}{\partial\bar{\tau}^K}\left(\frac{\bar{\tilde{w}}^s}{\bar{\tilde{w}}^u}\right) &= (\sigma-\rho)\left(\frac{\varphi}{1-\sigma+\varphi}\right)\frac{\bar{\tilde{w}}^s}{\bar{\tilde{w}}^u}\frac{1}{F}\lambda\left(\frac{\bar{\bar{K}}_e}{\bar{\bar{L}}_s}\right)^{\rho-1}\frac{\partial}{\partial\bar{\tau}^K}\left(\frac{\bar{\bar{K}}_e}{\bar{\bar{L}}_s}\right) \\ &< 0.\end{aligned}$$

B.3. Lump-sum transfer adjustment

We start with the case where lump-sum transfers adjust to finance the capital tax rate cut. It is useful to state a mild restriction on government spending in steady-state.[28]

[28] This restriction is very mild, and is just to ensure that government spending in steady-state is not very high. For instance, except for the case of an unrealistically high markup, this holds for any reasonable parameterization of government spending in steady-state.

Assumption 1. $\bar{\tilde{G}} < 1 - \frac{\theta-1}{\theta}\left(\frac{\bar{a}-(1-d)}{\frac{\bar{a}}{\bar{\beta}}-(1-d)}\right)\left(1-\bar{\tau}^K\right) = 1 - \frac{1}{\lambda}\left(\frac{\bar{\tilde{I}}}{\bar{\tilde{Y}}}\right)$ *in the initial steady-state.*

Then, we can formally show that a permanent capital tax rate cut leads to an increase in output, consumption, investment, and wages, and a decline in the rental rate of capital, as given in Proposition B.1.

Proposition B.1. *Fix* $\bar{\tau}^H$ *and* $\bar{\tilde{b}}$*. With lump-sum transfer adjustment,*

1. The rental rate of capital is increasing, while the capital-to-hours ratio, wage, hours, capital, investment, and output are decreasing in $\bar{\tau}^K$*.*

2. Under Assumption 1, consumption is also decreasing in $\bar{\tau}^K$*.*

Proof. See Appendix B.4. ■

B.4. Proof of Proposition B.1

Proof. From Equation (B.1) and Equation (B.4), we get

$$\frac{\partial \bar{r}^K}{\partial \bar{\tau}^K} = \frac{\bar{r}^K}{1-\bar{\tau}^K} > 0$$
$$\frac{\partial \bar{\tilde{w}}}{\partial \bar{\tau}^K} = -\left(\frac{\bar{\tilde{w}}}{\bar{r}^K}\right)\left(\frac{\lambda}{1-\lambda}\right)\frac{\partial \bar{r}^K}{\partial \bar{\tau}^K} < 0.$$

Let $\bar{\tilde{k}} = \frac{\bar{\tilde{K}}}{\bar{H}}$ and $\bar{\tilde{y}} = \frac{\bar{\tilde{Y}}}{\bar{H}}$. From Equation (B.2) and Equation (B.3), we get

$$\frac{\partial \bar{\tilde{k}}}{\partial \bar{\tau}^K} = -\frac{\bar{\tilde{k}}}{\bar{r}^K}\frac{1}{1-\lambda}\frac{\partial \bar{r}^K}{\partial \bar{\tau}^K} < 0$$
$$\frac{\partial \bar{\tilde{y}}}{\partial \bar{\tau}^K} = \lambda\frac{\bar{\tilde{y}}}{\bar{\tilde{k}}}\frac{\partial \bar{\tilde{k}}}{\partial \bar{\tau}^K} < 0$$

Combining Equation (B.4) and Equation (B.5) with Equation (B.6), we rewrite the steady-state hours as

$$\bar{H} = \left(\bar{\omega}\left(\frac{1}{1-\lambda}\frac{1+\bar{\tau}^C}{1-\bar{\tau}^H}\left(\frac{1-\bar{\tilde{G}}}{\bar{m}c} - \lambda\frac{\bar{a}-(1-d)}{\frac{\bar{a}}{\bar{\beta}}-(1-d)}\left(1-\bar{\tau}^K\right)\right)\right)\right)^{-\frac{1}{1+\varphi}}.$$

Then, the partial derivative with respect to the capital tax rate is

$$\frac{\partial \bar{H}}{\partial \bar{\tau}^K} = -\frac{\bar{H}^{2+\varphi}}{1+\varphi}\left(\bar{\omega}\frac{\lambda}{1-\lambda}\frac{1+\bar{\tau}^C}{1-\bar{\tau}^H}\frac{\bar{a}-(1-d)}{\frac{\bar{a}}{\bar{\beta}}-(1-d)}\right) < 0.$$

Now, we find the partial derivatives of the levels of the variables. For capital, investment, and output, we can easily verify that

$$\frac{\partial \bar{\tilde{K}}}{\partial \bar{\tau}^K} = \bar{H}\frac{\partial \bar{\tilde{k}}}{\partial \bar{\tau}^K} + \bar{\tilde{k}}\frac{\partial \bar{H}}{\partial \bar{\tau}^K} < 0$$
$$\frac{\partial \bar{\tilde{I}}}{\partial \bar{\tau}^K} = \frac{\partial \bar{\tilde{K}}}{\partial \bar{\tau}^K}(\bar{a}-(1-d)) < 0$$
$$\frac{\partial \bar{\tilde{Y}}}{\partial \bar{\tau}^K} = \bar{H}\frac{\partial \bar{\tilde{y}}}{\partial \bar{\tau}^K} + \bar{\tilde{y}}\frac{\partial \bar{H}}{\partial \bar{\tau}^K} < 0$$

For consumption, combining Equation (B.2) and Equation (B.7) with Equation (B.5), we get

$$\begin{aligned}\bar{\tilde{C}} &= \left(\left(1-\bar{\tilde{G}}\right)\frac{\bar{\tilde{Y}}}{\bar{H}} - \frac{\bar{\tilde{I}}}{\bar{H}}\right)\bar{H} \\ &= \left(\bar{m}c\frac{\lambda\left(1-\bar{\tau}^K\right)}{\frac{\bar{a}}{\bar{\beta}}-(1-d)}\right)^{\frac{\lambda}{1-\lambda}}\left[\left(1-\bar{\tilde{G}}\right) - \lambda\bar{m}c\frac{(\bar{a}-(1-d))}{\frac{\bar{a}}{\bar{\beta}}-(1-d)}\left(1-\bar{\tau}^K\right)\right]\bar{H}.\end{aligned}$$

Then, the partial derivative of consumption with respect to capital tax rate is

$$\frac{\partial\bar{\tilde{C}}}{\partial\bar{\tau}^K} = -\left(\frac{\lambda}{1-\lambda}\frac{1}{1-\bar{\tau}^K}\right)\left(\frac{\lambda\bar{m}c\left(1-\bar{\tau}^K\right)}{\frac{\bar{a}}{\bar{\beta}}-(1-d)}\right)^{\frac{\lambda}{1-\lambda}}\left[\left(1-\bar{\tilde{G}}\right) - \bar{m}c\frac{(\bar{a}-(1-d))}{\frac{\bar{a}}{\bar{\beta}}-(1-d)}\left(1-\bar{\tau}^K\right)\right]\bar{H} + \frac{\bar{\tilde{C}}}{\bar{H}}\frac{\partial\bar{H}}{\partial\bar{\tau}^K}.$$

Under Assumption 1, we find $\frac{\partial\bar{\tilde{C}}}{\partial\bar{\tau}^K} < 0$. ■

B.5. Proof of Proposition 1

Proof. All three comparisons in Proposition 1 follow from the same hours-ratio device used in the main-text intuition. Steady-state hours satisfy $\bar{H} = (\bar{\omega}\mathscr{W})^{-1/(1+\varphi)}$, where $\mathscr{W} = (1+\bar{\tau}^C)\bar{\tilde{C}}/[(1-\bar{\tau}^H)\bar{\tilde{w}}\bar{H}]$ is the labor-supply wedge. The capital-to-hours, output-to-hours, investment-to-hours, and consumption-to-hours ratios are pinned down by $\bar{\tau}^K$ alone and therefore cancel when ratios are taken across financing schemes; only the financing-specific component of $\mathscr{W}$ remains. The algebra below makes each comparison explicit.

From Equation (B.1), Equation (B.3), and Equation (B.4), we get

$$\begin{aligned}\frac{\bar{\tilde{K}}}{\bar{H}} &= \frac{\bar{\tilde{w}}}{\bar{r}^K}\frac{\lambda}{1-\lambda} \\ &= \left(\frac{\lambda\bar{m}c}{\frac{\bar{a}}{\bar{\beta}}-(1-d)}\left(1-\bar{\tau}^K\right)\right)^{\frac{1}{1-\lambda}}.\end{aligned}$$

The capital-to-hours ratio depends only on $\bar{\tau}^K$, so for a given new capital tax rate, it is common across all three financing schemes (transfer, labor-tax, and consumption-tax adjustment). The same is true of the output-to-hours, investment-to-hours, and consumption-to-hours ratios. Thus, all the magnitudes of changes in macro quantities to capital tax cuts are determined by the hours responses. Now, we compare the changes in hours to capital tax rate changes under the transfers adjustment case with the changes under the labor tax rate adjustment case. Notice that the initial steady states are the same in both cases. Let $\bar{H}^T_{new}$ and $\bar{H}^L_{new}$ denote the steady-state hours after the capital tax changes in the transfers adjustment case and in the labor tax rate adjustment case, respectively. Then, from Equation (B.6), we get

$$\begin{aligned}\frac{\bar{H}^T_{new}}{\bar{H}^L_{new}} &= \left(\frac{\frac{\bar{\omega}}{(1-\lambda)\bar{m}c}\frac{1+\bar{\tau}^C}{1-\bar{\tau}^H}\left(1-\bar{\tilde{G}}-\frac{\lambda\bar{m}c(\bar{a}-(1-d))}{\frac{\bar{a}}{\bar{\beta}}-(1-d)}\left(1-\bar{\tau}^K_{new}\right)\right)}{\frac{\bar{\omega}}{(1-\lambda)\bar{m}c}\frac{1+\bar{\tau}^C}{1-\bar{\tau}^H_{new}}\left(1-\bar{\tilde{G}}-\frac{\lambda\bar{m}c(\bar{a}-(1-d))}{\frac{\bar{a}}{\bar{\beta}}-(1-d)}\left(1-\bar{\tau}^K_{new}\right)\right)}\right)^{-\frac{1}{1+\varphi}} \\ &= \left(1-\frac{\Delta\left(\bar{\tau}^H\right)}{1-\bar{\tau}^H}\right)^{-\frac{1}{1+\varphi}} \\ &= \left(1+\frac{\lambda}{1-\lambda}\left(\frac{1}{1-\bar{\tau}^H}\right)\left(1+\bar{\tau}^C\left(\frac{\bar{a}-(1-d)}{\frac{\bar{a}}{\bar{\beta}}-(1-d)}\right)\right)\Delta\left(\bar{\tau}^K\right)\right)^{-\frac{1}{1+\varphi}}.\end{aligned}$$

For small changes in capital tax rate $\Delta\left(\bar{\tau}^K\right)$, we get

$$\begin{aligned}\ln\left(\frac{\bar{H}^T_{new}}{\bar{H}^L_{new}}\right) &= -\frac{1}{1+\varphi}\frac{\lambda}{1-\lambda}\left(\frac{1}{1-\bar{\tau}^H}\right)\left(1+\bar{\tau}^C\left(\frac{\bar{a}-(1-d)}{\frac{\bar{a}}{\beta}-(1-d)}\right)\right)\Delta\left(\bar{\tau}^K\right)\\ &= -\Theta\Delta\left(\bar{\tau}^K\right)\end{aligned}$$

where $\Theta = \frac{1}{1+\varphi}\frac{\lambda}{1-\lambda}\left(\frac{1}{1-\bar{\tau}^H}\right)\left(1+\bar{\tau}^C\frac{(\bar{a}-(1-d))}{\frac{\bar{a}}{\beta}-(1-d)}\right) > 0$. Then, for the levels of output, consumption, capital and investment, the differences are the same: that is,

$$\ln\left(\frac{\bar{\tilde{Y}}^T_{new}}{\bar{\tilde{Y}}^L_{new}}\right) = \ln\left(\frac{\bar{\tilde{C}}^T_{new}}{\bar{\tilde{C}}^L_{new}}\right) = \ln\left(\frac{\bar{\tilde{K}}^T_{new}}{\bar{\tilde{K}}^L_{new}}\right) = \ln\left(\frac{\bar{\tilde{I}}^T_{new}}{\bar{\tilde{I}}^L_{new}}\right) = \ln\left(\frac{\bar{H}^T_{new}}{\bar{H}^L_{new}}\right) = -\Theta\Delta\left(\bar{\tau}^K\right).$$

Notice that $\frac{\partial\ln\left(\frac{\bar{\tilde{Y}}^T_{new}}{\bar{\tilde{Y}}^L_{new}}\right)}{\partial\bar{\tau}^H} = -\frac{\Theta}{1-\bar{\tau}^H}\Delta\left(\bar{\tau}^K\right)$ implying that the gap is increasing in the initial level of $\bar{\tau}^H$ when there is a capital tax cut.

Now, let $\bar{H}^T_{new}$ and $\bar{H}^C_{new}$ denote the steady-state hours after the capital tax changes in the transfers adjustment case and in the consumption tax rate adjustment case, respectively. Then, we get

$$\begin{aligned}\frac{\bar{H}^T_{new}}{\bar{H}^C_{new}} &= \left(\frac{\frac{\bar{\omega}}{(1-\lambda)\bar{m}c}\frac{1+\bar{\tau}^C}{1-\bar{\tau}^H}\left(1-\bar{\tilde{G}}-\frac{\lambda\bar{m}c(\bar{a}-(1-d))}{\frac{\bar{a}}{\beta}-(1-d)}\left(1-\bar{\tau}^K_{new}\right)\right)}{\frac{\bar{\omega}}{(1-\lambda)\bar{m}c}\frac{1+\bar{\tau}^C_{new}}{1-\bar{\tau}^H}\left(1-\bar{\tilde{G}}-\frac{\lambda\bar{m}c(\bar{a}-(1-d))}{\frac{\bar{a}}{\beta}-(1-d)}\left(1-\bar{\tau}^K_{new}\right)\right)}\right)^{-\frac{1}{1+\varphi}}\\ &= \left(1+\frac{\Delta\left(\bar{\tau}^C\right)}{1+\bar{\tau}^C}\right)^{\frac{1}{1+\varphi}}\\ &= \left(1-\left(\frac{1+\left(\frac{\bar{a}-(1-d)}{\frac{\bar{a}}{\beta}-(1-d)}\right)\bar{\tau}^C}{1+\bar{\tau}^C}\right)\frac{\Delta\left(\bar{\tau}^K\right)}{1+\left(\frac{\bar{a}-(1-d)}{\frac{\bar{a}}{\beta}-(1-d)}\right)\Delta\left(\bar{\tau}^K\right)}\right)^{\frac{1}{1+\varphi}}\end{aligned}$$

For small changes in capital tax rate $\Delta\left(\bar{\tau}^K\right)$, we get

$$\ln\left(\frac{\bar{H}^T_{new}}{\bar{H}^C_{new}}\right) = -\frac{1}{1+\varphi}\left(\frac{1+\left(\frac{\bar{a}-(1-d)}{\frac{\bar{a}}{\beta}-(1-d)}\right)\bar{\tau}^C}{1+\bar{\tau}^C}\right)\left(\frac{\lambda\bar{m}c}{\left(1-\bar{\tilde{G}}\right)-\frac{\bar{a}-(1-d)}{\frac{\bar{a}}{\beta}-(1-d)}\lambda\bar{m}c\left(1-\bar{\tau}^K_{new}\right)}\right)\Delta\left(\bar{\tau}^K\right)$$

Then, for the levels of output, consumption, capital, and investment, the differences are the same: that is,

$$\begin{aligned}\ln\left(\frac{\bar{\tilde{Y}}^T_{new}}{\bar{\tilde{Y}}^C_{new}}\right) &= \ln\left(\frac{\bar{\tilde{C}}^T_{new}}{\bar{\tilde{C}}^C_{new}}\right) = \ln\left(\frac{\bar{\tilde{K}}^T_{new}}{\bar{\tilde{K}}^C_{new}}\right) = \ln\left(\frac{\bar{\tilde{I}}^T_{new}}{\bar{\tilde{I}}^C_{new}}\right) = \ln\left(\frac{\bar{H}^T_{new}}{\bar{H}^C_{new}}\right)\\ &= \frac{1}{1+\varphi}\frac{\Delta\left(\bar{\tau}^C\right)}{1+\bar{\tau}^C}\\ &= -\frac{1}{1+\varphi}\left(\frac{1+\left(\frac{\bar{a}-(1-d)}{\frac{\bar{a}}{\beta}-(1-d)}\right)\bar{\tau}^C}{1+\bar{\tau}^C}\right)\left(\frac{\lambda\bar{m}c}{\left(1-\bar{\tilde{G}}\right)-\frac{\bar{a}-(1-d)}{\frac{\bar{a}}{\beta}-(1-d)}\lambda\bar{m}c\left(1-\bar{\tau}^K_{new}\right)}\right)\Delta\left(\bar{\tau}^K\right)\\ &= -\mathscr{M}^T_C\Delta\left(\bar{\tau}^K\right).\end{aligned}$$

Then, $\mathscr{M}_C^T = \frac{1}{1+\varphi}\left(\frac{1+\left(\frac{\bar{a}-(1-d)}{\frac{\bar{a}}{\bar{\beta}}-(1-d)}\right)\bar{\tau}^C}{1+\bar{\tau}^C}\right)\left(\frac{\lambda\bar{m}c}{\left(1-\bar{\tilde{G}}\right)-\frac{\bar{a}-(1-d)}{\frac{\bar{a}}{\bar{\beta}}-(1-d)}\lambda\bar{m}c\left(1-\bar{\tau}^K_{new}\right)}\right) > 0$ if

$$\bar{\tilde{G}} < 1-\lambda\frac{\theta-1}{\theta}\frac{\bar{a}-(1-d)}{\frac{\bar{a}}{\bar{\beta}}-(1-d)}\left(1-\bar{\tau}^K_{new}\right)$$

$$\approx 0.848$$

in our calibration. In this case, capital tax cut is more expansionary in the transfer adjustment case than in the consumption tax rate adjustment case.

Notice that $\frac{\partial \ln\left(\frac{\bar{\tilde{Y}}^T_{new}}{\bar{\tilde{Y}}^C_{new}}\right)}{\partial\bar{\tau}^C} = \frac{1}{1+\varphi}\left(\frac{1-\left(\frac{\bar{a}-(1-d)}{\frac{\bar{a}}{\bar{\beta}}-(1-d)}\right)}{\left(1+\bar{\tau}^C\right)^2}\right)\left(\frac{\lambda\bar{m}c}{\left(1-\bar{\tilde{G}}\right)-\frac{\bar{a}-(1-d)}{\frac{\bar{a}}{\bar{\beta}}-(1-d)}\lambda\bar{m}c\left(1-\bar{\tau}^K_{new}\right)}\right)\Delta\left(\bar{\tau}^K\right)$ implying that the gap is decreasing in the initial level of $\bar{\tau}^C$ when there is a capital tax cut.

Lastly, let $\bar{H}^L_{new}$ and $\bar{H}^C_{new}$ denote the steady-state hours after the capital tax changes in the labor tax adjustment case and in the consumption tax adjustment case, respectively. Then, we get

$$\begin{aligned}
\frac{\bar{H}^L_{new}}{\bar{H}^C_{new}} &= \left(\frac{\frac{\bar{\omega}}{(1-\lambda)\bar{m}c}\frac{1+\bar{\tau}^C}{1-\bar{\tau}^H_{new}}\left(1-\bar{\tilde{G}}-\frac{\lambda\bar{m}c(\bar{a}-(1-d))}{\frac{\bar{a}}{\bar{\beta}}-(1-d)}\left(1-\bar{\tau}^K_{new}\right)\right)}{\frac{\bar{\omega}}{(1-\lambda)\bar{m}c}\frac{1+\bar{\tau}^C_{new}}{1-\bar{\tau}^H}\left(1-\bar{\tilde{G}}-\frac{\lambda\bar{m}c(\bar{a}-(1-d))}{\frac{\bar{a}}{\bar{\beta}}-(1-d)}\left(1-\bar{\tau}^K_{new}\right)\right)}\right)^{-\frac{1}{1+\varphi}} \\
&= \left(\frac{1+\bar{\tau}^C_{new}}{1+\bar{\tau}^C}\frac{1-\bar{\tau}^H_{new}}{1-\bar{\tau}^H}\right)^{\frac{1}{1+\varphi}} \\
&= \left(\left(1+\frac{\Delta\left(\bar{\tau}^C\right)}{1+\bar{\tau}^C}\right)\left(1-\frac{\Delta\left(\bar{\tau}^H\right)}{1-\bar{\tau}^H}\right)\right)^{\frac{1}{1+\varphi}} \\
&= \left(\left(1-\frac{1+\frac{\bar{a}-(1-d)}{\frac{\bar{a}}{\bar{\beta}}-(1-d)}\bar{\tau}^C}{1+\bar{\tau}^C}\frac{\lambda\bar{m}c}{\left(1-\bar{\tilde{G}}\right)-\frac{\bar{a}-(1-d)}{\frac{\bar{a}}{\bar{\beta}}-(1-d)}\lambda\bar{m}c\left(1-\bar{\tau}^K_{new}\right)}\Delta\left(\bar{\tau}^K\right)\right)\left(1+\frac{1+\frac{\bar{a}-(1-d)}{\frac{\bar{a}}{\bar{\beta}}-(1-d)}\bar{\tau}^C}{1-\bar{\tau}^H}\frac{\lambda}{1-\lambda}\Delta\left(\bar{\tau}^K\right)\right)\right)^{\frac{1}{1+\varphi}}
\end{aligned}$$

For small changes in capital tax rate $\Delta\left(\bar{\tau}^K\right)$, we get

$$\begin{aligned}
\ln\left(\frac{\bar{H}^L_{new}}{\bar{H}^C_{new}}\right) &= \frac{1}{1+\varphi}\left(\frac{\Delta\left(\bar{\tau}^C\right)}{1+\bar{\tau}^C}-\frac{\Delta\left(\bar{\tau}^H\right)}{1-\bar{\tau}^H}\right) \\
&= \frac{1}{1+\varphi}\left(1+\frac{\bar{a}-(1-d)}{\frac{\bar{a}}{\bar{\beta}}-(1-d)}\bar{\tau}^C\right)\left(\frac{1}{1-\bar{\tau}^H}\frac{\lambda}{1-\lambda}-\frac{1}{1+\bar{\tau}^C}\frac{\lambda\bar{m}c}{\left(1-\bar{\tilde{G}}\right)-\frac{\bar{a}-(1-d)}{\frac{\bar{a}}{\bar{\beta}}-(1-d)}\lambda\bar{m}c\left(1-\bar{\tau}^K_{new}\right)}\right)\Delta\left(\bar{\tau}^K\right) \\
&= \frac{1}{1+\varphi}\left(\frac{\lambda}{1-\lambda}\right)\left(\frac{1+\frac{\bar{a}-(1-d)}{\frac{\bar{a}}{\bar{\beta}}-(1-d)}\bar{\tau}^C}{1-\bar{\tau}^H}\right)\left(1-\frac{1-\bar{\tau}^H}{1+\bar{\tau}^C}\frac{(1-\lambda)\,\bar{m}c}{\left(1-\bar{\tilde{G}}\right)-\frac{\bar{a}-(1-d)}{\frac{\bar{a}}{\bar{\beta}}-(1-d)}\lambda\bar{m}c\left(1-\bar{\tau}^K_{new}\right)}\right)\Delta\left(\bar{\tau}^K\right)
\end{aligned}$$

Then, for the levels of output, consumption, capital, and investment, the differences are the same: that is,

$$\ln\left(\frac{\bar{\tilde{Y}}^L_{new}}{\bar{\tilde{Y}}^C_{new}}\right) = \ln\left(\frac{\bar{\tilde{C}}^L_{new}}{\bar{\tilde{C}}^C_{new}}\right) = \ln\left(\frac{\bar{\tilde{K}}^L_{new}}{\bar{\tilde{K}}^C_{new}}\right) = \ln\left(\frac{\bar{\tilde{I}}^L_{new}}{\bar{\tilde{I}}^C_{new}}\right) = \ln\left(\frac{\bar{H}^L_{new}}{\bar{H}^C_{new}}\right) = \frac{1}{1+\varphi}\left(\frac{\Delta\left(\bar{\tau}^C\right)}{1+\bar{\tau}^C}-\frac{\Delta\left(\bar{\tau}^H\right)}{1-\bar{\tau}^H}\right)$$

$$= \frac{1}{1+\varphi}\left(\frac{\lambda}{1-\lambda}\right)\left(\frac{1+\frac{\bar{a}-(1-d)}{\frac{\bar{a}}{\bar{\beta}}-(1-d)}\bar{\tau}^C}{1-\bar{\tau}^H}\right)\left(1-\frac{1-\bar{\tau}^H}{1+\bar{\tau}^C}\frac{(1-\lambda)\,\bar{mc}}{\left(1-\bar{\bar{G}}\right)-\frac{\bar{a}-(1-d)}{\frac{\bar{a}}{\bar{\beta}}-(1-d)}\lambda\bar{mc}\left(1-\bar{\tau}^K_{new}\right)}\right)\Delta\left(\bar{\tau}^K\right)$$

$$= \mathscr{M}^L_C\,\Delta\left(\bar{\tau}^K\right).$$

Notice that $\mathscr{M}^L_C = \frac{1}{1+\varphi}\left(\frac{\lambda}{1-\lambda}\right)\left(\frac{1+\frac{\bar{a}-(1-d)}{\frac{\bar{a}}{\bar{\beta}}-(1-d)}\bar{\tau}^C}{1-\bar{\tau}^H}\right)\left(1-\frac{1-\bar{\tau}^H}{1+\bar{\tau}^C}\frac{(1-\lambda)\bar{mc}}{\left(1-\bar{\bar{G}}\right)-\frac{\bar{a}-(1-d)}{\frac{\bar{a}}{\bar{\beta}}-(1-d)}\lambda\bar{mc}\left(1-\bar{\tau}^K_{new}\right)}\right) > 0$ if

$$\bar{\bar{G}} < 1-\lambda\frac{\theta-1}{\theta}\frac{\bar{a}-(1-d)}{\frac{\bar{a}}{\bar{\beta}}-(1-d)}\left(1-\bar{\tau}^K_{new}\right)-(1-\lambda)\frac{\theta-1}{\theta}\frac{1-\bar{\tau}^H}{1+\bar{\tau}^C}$$

$$\approx 0.4291$$

in our baseline calibration. The expression above is the relevant general comparison. It shows that the labor-tax case has lower hours than the consumption-tax case whenever the labor-tax wedge increase, $\Delta\left(\bar{\tau}^H\right)/(1-\bar{\tau}^H)$, exceeds the consumption-tax wedge increase, $\Delta\left(\bar{\tau}^C\right)/(1+\bar{\tau}^C)$. Under the stated government-spending condition, this is exactly what occurs after a capital tax cut. ■

C Data appendix

This appendix describes the data sources and methodology used to calibrate the model. The baseline calibration targets the 2015Q1–2017Q4 period, chosen to characterize the pre-TCJA steady state. All macroeconomic and fiscal data are quarterly, seasonally adjusted at annual rates (SAAR), sourced from the Federal Reserve Economic Data (FRED) database maintained by the Federal Reserve Bank of St. Louis unless otherwise noted. Table C.1 summarizes all data series used.

C.1. Debt and spending data

Government debt is measured as federal debt held by the public as a percentage of Y_{adj}. The 2015Q1–2017Q4 average is approximately 82.9%, which we set as $\bar{\bar{b}} = 0.829$.

We map the model's G to government consumption expenditures at all levels of government, which excludes gross government investment. The 2015Q1–2017Q4 average is approximately 15.5% of Y_{adj}, which we set as $\bar{\bar{G}} = 0.155$. We exclude gross government investment from G because the model has no public-capital accumulation: G enters the resource constraint as a current-period purchase that does not build a productive stock, while government gross investment in the data does. Mapping gross investment to model G would therefore treat productive public capital as if it were consumed each period, which is inconsistent with the model's structure. By the same logic, the model-consistent output measure $Y_{\text{adj}} = C + I_e + I_b + G$ also excludes gross government investment (along with net exports and intellectual property products that the model abstracts from); over 2015Q1–2017Q4, $Y_{\text{adj}}/\text{GDP} \approx 0.90$.

Appendix Table C.1: Data sources for calibration

Variable	FRED Series	NIPA Reference	Sample
Panel A: Fiscal variables			
Debt held by public / GDP	FYGFGDQ188S	—	2015–17
Gov. consumption	A955RC1Q027SBEA	—	2015–17
Nominal GDP	GDP	—	2015–17
Panel B: Tax revenue (MRT method)			
Federal personal taxes	A074RC1Q027SBEA	Table 3.2, line 3	2015–17
S&L personal taxes	ASLSTAX	Table 3.3	2015–17
Federal corporate taxes	B075RC1Q027SBEA	Table 3.2, line 7	2015–17
S&L corporate taxes	B248RC1Q027SBEA	Table 3.3	2015–17
Federal indirect taxes	W007RC1Q027SBEA	Table 3.2, line 4	2015–17
S&L indirect taxes	B234RC1Q027SBEA	Table 3.3	2015–17
Social insurance contr.	W780RC1Q027SBEA	Table 3.2, line 11	2015–17
Panel C: Income components			
Compensation of employees	COE	Table 1.12, line 2	2015–17
Proprietors' income	PROPINC	Table 1.12, line 9	2015–17
Rental income	RENTIN	Table 1.12, line 12	2015–17
Corporate profits	CPROFIT	Table 1.12, line 13	2015–17
Net interest income	A064RC1Q027SBEA	Table 1.12, line 18	2015–17
Personal consumption exp.	PCE	—	2015–17
Panel D: Investment			
Total nonresidential inv.	PNFI	—	2015–17
Equipment investment	Y033RC1Q027SBEA	—	2015–17
Structures investment	B009RC1Q027SBEA	—	2015–17
Panel E: Capital stocks and depreciation (annual)			
Net stock: nonres. equipment	K1NTOTL1EQ000	BEA FAT 6.1	2015–17
Net stock: nonres. structures	K1NTOTL1ST000	BEA FAT 6.1	2015–17
CFC: nonres. equipment	M1NTOTL1EQ000	BEA FAT 6.4	2015–17
CFC: nonres. structures	M1NTOTL1ST000	BEA FAT 6.4	2015–17
Panel F: Labor market			
Skill premium (BA+ vs. no-BA)	—	BLS CPS Table 5	2015–17
Fraction skilled (N^s)	—	BLS CPS Table 5	2015–17

Notes: All FRED series are quarterly, seasonally adjusted at annual rates (SAAR), in billions of dollars unless noted. Capital stock and CFC series (Panel E) are annual, in billions of dollars. "S&L" denotes state and local; "BEA FAT" denotes BEA Fixed Asset Tables; "CFC" denotes consumption of fixed capital. The MRT method follows Mendoza et al. (1994). Sample "2015–17" refers to 2015Q1–2017Q4 averages for quarterly series and 2015–2017 averages for annual series. Labor market data are from the Bureau of Labor Statistics Current Population Survey, full-time wage and salary workers aged 25+.

C.2. Tax data

We compute effective tax rates following the methodology of Mendoza et al. (1994) (MRT), which constructs effective tax rates on consumption, labor income, and capital income using National

Income and Product Account (NIPA) data at all levels of government (federal, state, and local). All FRED series codes are listed in Table C.1.

The MRT method computes effective tax rates as follows. First, the average personal income tax rate is

$$\tau^P = \frac{IT}{W + PRI/2 + CI}$$

where IT is total personal current tax revenues (federal plus state and local), W is compensation of employees, PRI is proprietors' income, and CI is capital income, defined as the sum of rental income, corporate profits, net interest income, and $PRI/2$. Half of proprietors' income is attributed to labor and half to capital.

The consumption tax rate is

$$\tau^C = \frac{T^{C,\text{total}}}{PCE - T^{C,\text{total}}}$$

where $T^{C,\text{total}}$ is total indirect taxes (federal plus state and local taxes on production and imports) and PCE is personal consumption expenditures. The labor tax revenue is

$$T^H = \tau^P (W + PRI/2) + CSI_{\text{total}}$$

where CSI_{total} is total contributions for government social insurance. The capital tax revenue is

$$T^K = \tau^P \cdot CI + CT_{\text{total}}$$

where CT_{total} includes federal, state, and local taxes on corporate income. We normalize all tax revenue variables by Y_{adj}.

For the 2015Q1–2017Q4 period, the MRT method yields a consumption tax revenue-to-Y_{adj} ratio of $\bar{\tilde{T}}^C = 0.0138$, a labor tax revenue-to-Y_{adj} ratio of $\bar{\tilde{T}}^H = 0.143$, and a capital tax revenue-to-Y_{adj} ratio of 0.086, where $Y_{\text{adj}} \equiv C + I_e + I_b + G$ is the model-consistent output measure. We target the consumption and labor tax revenue ratios directly in the calibration. The MRT capital tax revenue ratio (0.086) is reported for completeness but is not a calibration target: instead, we calibrate the steady-state markup to deliver the pre-TCJA statutory capital tax rate of 35%. The model's resulting capital tax revenue at the initial steady state ($\bar{\tilde{T}}^K \approx 0.024$ of Y_{adj}; see Section 3.2) is therefore smaller than the MRT measure because the two objects use different tax bases: the model applies τ^K to rental returns on equipment and structures net of depreciation allowances (λ_b, λ_e from Barro and Furman (2018)), whereas the MRT capital income concept aggregates rental income, corporate profits, net interest, and half of proprietors' income. The two measures are therefore not intended to coincide. Given the calibrated tax rates and the government budget constraint, transfers $\bar{\tilde{S}}$ are determined residually.

C.3. Depreciation rates

Quarterly depreciation rates for equipment and structures capital are computed from the Bureau of Economic Analysis (BEA) Fixed Asset Tables, available via FRED. For each asset type $j \in \{e, b\}$, we compute the annual depreciation rate as the ratio of consumption of fixed capital (CFC) to the current-cost net stock of capital:

$$\delta_j^{\text{annual}} = \frac{\text{CFC}_j}{K_j}$$

and convert to a quarterly rate via $d_j = 1 - (1 - \delta_j^{\text{annual}})^{1/4}$.

The FRED series used are: `K1NTOTL1EQ000` (current-cost net stock of private nonresidential equipment) and `K1NTOTL1ST000` (structures) for the capital stocks; `M1NTOTL1EQ000` and `M1NTOTL1ST000` for the corresponding CFC flows. The 2015–2017 averages yield annual depreciation rates of 13.6% for equipment and 3.1% for structures, corresponding to quarterly rates of $d_e = 0.036$ and $d_b = 0.0078$, respectively.

C.4. Investment data

We define the model-consistent output measure as $Y_{\text{adj}} \equiv C + I_e + I_b + G$, where G is government consumption expenditures (excluding gross government investment, as discussed above). Y_{adj} thus excludes net exports, intellectual property products, and gross government investment from GDP. Over 2015Q1–2017Q4, $Y_{\text{adj}}/\text{GDP} = 0.90$. The 2015Q1–2017Q4 averages of investment-to-Y_{adj} ratios are: equipment (I_e/Y_{adj}) 6.7% and structures (I_b/Y_{adj}) 3.4%. The structures investment share is matched exactly by setting the structures capital income share $\alpha = 0.073$ analytically. The equipment investment share is used as one of three calibration targets for $\{\lambda, \mu, q_0\}$ along with the labor share and skill premium. The consumption-to-Y_{adj} ratio averages 74.5% in data.

C.5. Skill premium and fraction skilled

We define skilled workers as those holding a bachelor's degree or higher (BA+), consistent with the convention in the literature on rising earnings inequality (Autor, 2014). Using the Bureau of Labor Statistics' Current Population Survey (CPS) data on usual weekly earnings of full-time wage and salary workers aged 25 and over (BLS Table 5), the ratio of median weekly earnings of BA+ workers to that of workers without a bachelor's degree yields a skill premium of approximately 82% when averaged over 2015–2017, which we use as our calibration target for the steady-state wage ratio $\bar{\tilde{w}}^s / \bar{\tilde{w}}^u = 1.82$.

The fraction of skilled workers is computed from the same BLS CPS data used for the skill premium: among full-time wage and salary workers aged 25 and over, the share with a bachelor's degree or higher averaged 40.8% over 2015–2017, which we set as $N^s = 0.41$. This ensures consistency between the skill premium target and the population composition. For steady-state

hours, we normalize skilled hours at $\bar{H}^s = 0.33$, following the standard RBC convention of one-third of discretionary time devoted to market work. Unskilled hours are set at $\bar{H}^u = \bar{H}^s/1.07 = 0.308$, so that the ratio $\bar{H}^s/\bar{H}^u = 1.07$. This ratio is grounded in the CPS data: over 2015–2017, workers with a BA or higher averaged approximately 40.5 usual weekly hours, compared to approximately 38 hours for workers with a high school diploma, yielding a skilled-to-unskilled hours ratio of 1.07.

C.6. Expensing rates

The effective expensing rates for structures ($\lambda_b = 0.338$) and equipment ($\lambda_e = 0.812$) are taken from Barro and Furman (2018), reflecting the pre-TCJA tax treatment of depreciation allowances.

D Estimation of labor tax adjustment rule

This appendix describes the empirical estimation of the labor tax rate adjustment rule used in the transition dynamics analysis of Section 4. The estimated rule governs how labor tax rates respond to deviations of debt from its steady-state level, output growth, and the output gap, subject to smoothing. We estimate the rule on U.S. quarterly data over two sub-samples and use the estimates from the first sub-sample (1983Q1–2002Q4) as our baseline parameterization.

The labor tax rate adjustment rule is specified as follows:

$$\begin{aligned}\tau_t^H - \bar{\tau}_{new}^H = {} & \rho_1^H\left(\tau_{t-1}^H - \bar{\tau}_{new}^H\right) + \rho_2^H\left(\tau_{t-2}^H - \bar{\tau}_{new}^H\right) \\ & + \left(1-\rho_1^H-\rho_2^H\right)\left\{\psi_B^H\left(\frac{B_{t-1}}{P_{t-1}Y_{t-1}} - \frac{\overline{B}}{PY}\right) + \psi_{\Delta Y}^H\left(\frac{Y_t}{Y_{t-1}}\right) + \psi_x^H\left(\frac{Y_t}{Y_t^n}\right)\right\}\end{aligned}$$

where Y_t^n is the natural level of output. We estimate an empirical version of this rule by OLS. We first estimate the composite coefficients $\left(1-\rho_1^H-\rho_2^H\right)\psi_B^H$, $\left(1-\rho_1^H-\rho_2^H\right)\psi_{\Delta Y}^H$, and $\left(1-\rho_1^H-\rho_2^H\right)\psi_x^H$ and then recover ψ_B^H, $\psi_{\Delta Y}^H$, and ψ_x^H using the estimate of ρ_1^H and ρ_2^H. We use quarterly U.S. data for estimation: tax revenues-to-output ratio, market value of government debt-to-output ratio, output growth, and the gap between actual output and potential output. The rule is estimated on two sub-periods. The first sub-sample covers the period from 1983Q1 through 2002Q4, as in Coibion and Gorodnichenko (2011) and the second sub-sample covers the period from 2001Q1 through 2019Q3. For the first sub-sample, we drop the second lag of the tax revenues to ensure stationarity of the tax rule. The series are taken from FRED of the Federal Reserve Bank of St. Louis. Potential output is the real potential gross domestic product estimated by the U.S Congressional Budget Office. Table F.1 shows the estimation results.

E Sensitivity analysis

This appendix presents detailed sensitivity analysis results summarized in Section 7 of the main text. We examine long-run effects, transition dynamics, and welfare across variations in

the Frisch elasticity of labor supply (φ), the equipment capital share (λ), profit and transfer distribution assumptions, and the inflation feedback parameter in the Taylor rule. The figures below complement the main text discussion by showing the full set of impulse responses and steady-state comparisons.

E.1. Long-run results

We start with long-run effects. First, we present comparative statics results with respect to the Frisch elasticity of labor supply. This is an important parameter, given that different sources of financing imply different labor supply responses. Appendix Figures F.1 and F.2 show how, with transfer adjustment, a higher Frisch elasticity leads to larger output effects while the reverse holds for labor tax adjustment. Next, in Appendix Figures F.3 and F.4, we compare across the three fiscal adjustments for a given Frisch elasticity. Consistent with Proposition 1, the difference between the transfer adjustment case and the labor tax adjustment case is bigger for a higher Frisch elasticity.

As there are heterogeneous agents in our model, clearly, the assumptions made on how profits and transfers are distributed across the two types of households make a non-trivial difference for distributional variables. Appendix Figure F.5 shows long-run results under various combinations of these distributions. For instance, if the skilled workers get both the profits and (cut in) transfers, it leads to a decline in consumption inequality, in sharp contrast to the baseline case. The results also show that aggregate effects on output and investment, however, are relatively similar across the various possibilities for profits and transfer distributions.

We also present results on the equipment capital share parameter, λ, in Appendix Figures F.6 and F.7. Our calibration strategy for this parameter is to match the labor share, and now we vary λ to both higher and lower values than the baseline. We find that the results are robust qualitatively overall, and for aggregate variables, the quantitative differences are small. For consumption, there are some quantitative differences, as a smaller λ is more beneficial for the unskilled.

E.2. Transition dynamics

We next move to transition dynamics. Appendix Figure F.8 performs the analogous exercise under the BFM funded/unfunded decomposition, varying the shadow-economy Taylor rule coefficient ϕ_π^F across passive values $\{0, 0.5, 0.9\}$. The transition dynamics are very robust: the magnitudes of the inflation and debt responses adjust slightly, but the qualitative path of output, consumption, investment, and the skill premium is essentially identical across parameterizations. This robustness is expected because the shadow economy in BFM only governs how the unfunded component of the fiscal adjustment is absorbed, while the actual-economy rules continue to respond actively to the funded component.

We then show transition dynamics under transfer adjustment with two different rules for

profit and transfer distributions, one the baseline and the other where the skilled workers get both the profits and (cut in) transfers. Again, like with the long-run, Appendix Figure F.9 shows that the differences are less prominent in output effects, but show up more prominently in distributional variables. For instance, consumption of unskilled falls for a short-period only, whereas skilled consumption falls persistently, thereby leading consumption inequality to actually fall after a few periods. Moreover, the same dynamic pattern holds for wage inequality, which falls after a few periods.

E.3. Anticipated tax cut

Our baseline analysis assumes a surprise tax reform. In practice, the TCJA was largely anticipated: markets began pricing the reform after the November 2016 election, and legislative proposals circulated throughout 2017. To assess the sensitivity of our transition dynamics to this assumption, we implement an anticipated tax cut where the policy is announced four quarters before implementation, and agents adjust under perfect foresight.

Appendix Figure F.10 compares the anticipated and surprise cases under labor tax adjustment. The key difference is in the short-run dynamics during the announcement period (quarters 0–3). Under the anticipated case, agents delay investment in anticipation of the forthcoming lower capital tax rate: equipment and structure investment remain near their initial steady-state levels during the announcement window, whereas they jump immediately under the surprise case. This investment delay deepens the output contraction during the announcement period relative to the surprise baseline (output falls approximately 1.2% vs. 0.5%). Consumption of both household types also declines more sharply, as the economy has not yet received the tax cut, but agents have already begun reallocating. When the tax cut takes effect in quarter 4, investment surges—overshooting the surprise path—and output, wages, and consumption rebound strongly. By quarter 12, the two paths largely coincide, and the long-run steady state and welfare ranking are unchanged. The anticipated case thus illustrates that news about a future capital tax cut generates an intertemporal substitution effect that amplifies short-run volatility, even though the long-run effects are identical.

E.4. Welfare results

Finally, we end with welfare results under various values of the Frisch elasticity of labor supply. Appendix Figure F.11 shows that our main welfare ranking is robust to both higher and lower Frisch elasticities: transfer and labor tax adjustments continue to deliver clear unskilled welfare losses, while consumption tax adjustment yields the most favorable unskilled outcome at all elasticities considered. Next, we do a sensitivity analysis on the equipment capital share parameter, λ. As shown in Appendix Figure F.12, the same welfare ranking is preserved across λ values; the absolute magnitude of unskilled losses widens at higher λ under transfer and labor tax

adjustment, reflecting the stronger capital-skill complementarity channel. Appendix Figure F.13 presents welfare results under the permanent PMAF regime, showing that the welfare ranking across household types is preserved under this alternative monetary-fiscal regime. Welfare under BFM monetary accommodation is shown in Figure 4(c) in the main text; the dedicated Cons+BFM sensitivity exercise in Figure F.14 confirms that unskilled welfare under consumption tax+BFM remains positive across the entire parameter grid considered.

E.5. Full expensing

Under U.S. tax law prior to the TCJA, firms could deduct a fraction of equipment investment from taxable income (bonus depreciation). The TCJA temporarily expanded this to full expensing ($\lambda_e = 1$) through 2022. In our baseline, λ_e is set to match pre-TCJA partial expensing rules. We examine the effect of pairing the rate cut with full expensing under labor tax adjustment. Appendix Figure F.15 shows the results. Full expensing amplifies the investment response, particularly for equipment capital, and generates a somewhat larger output effect. The distributional consequences are modestly amplified as well, since equipment capital is complementary to skilled labor.

E.6. Government spending rule

Our baseline assumes government spending maintains a constant ratio to GDP (G/Y), so that government spending rises with output in the new steady state. An alternative assumption is that government spending is fixed in levels. Under this rule, the expanding economy generates "fiscal space" as the spending-to-GDP ratio falls, partially offsetting the revenue loss from the capital tax cut. Appendix Figure F.16 compares the two rules under labor tax adjustment. The fixed-spending rule produces modestly smaller labor tax increases and correspondingly smaller distortionary effects on hours and output. The qualitative results are unchanged.

E.7. Skilled labor share

Our baseline calibration sets the share of skilled workers at $N^s = 0.41$, computed as the share of full-time wage and salary workers aged 25+ with a BA or higher from the BLS CPS data, averaged over 2015–2017. This parameter affects the relative size of the two household types and hence the magnitude of distributional effects. Appendix Figure F.17 shows transition dynamics under labor tax adjustment for $N^s \in \{0.30, 0.41, 0.50\}$, with $\{\lambda, \mu\}$ recalibrated for each N^s to match the same labor share and skill premium targets. A higher-skilled share dilutes the distributional effects—the skill premium increase is smaller, and consumption inequality rises less—but aggregate effects on output and investment are relatively stable. This confirms that our distributional findings are driven by the capital-skill complementarity channel rather than an artifact of the chosen population share.

E.8. Permanent PMAF regime

As an alternative to the BFM funded/unfunded decomposition presented in the main text, we examine a permanent passive monetary/active fiscal (PMAF) regime. In this case, the monetary policy rule (2.2) does not satisfy the Taylor principle ($\phi_\pi = 0$, $\phi_{\Delta y} = 0$, $\phi_x = 0$), while the labor tax rule (2.3) features a weak response to debt. The combination allows inflation to play a direct role in government debt stabilization throughout the transition.[29]

Appendix Figure F.18 compares the permanent PMAF results with the BFM and pure labor tax adjustment cases. We use the same set of parameters in Panel D of Table 4 for both cases. The main difference from the pure labor tax adjustment, under permanent PMAF, is a short-run burst of inflation that helps stabilize debt. This increase in inflation, as the model has nominal rigidities, counteracts the short-run contractionary effects: output, consumption, investment, hours, and wages all increase on impact, and the differences are quite pronounced for all variables other than investment. After approximately 8 quarters, the transition dynamics become very similar to the pure labor tax rate adjustment case. Interestingly, the debt-to-GDP ratio, in sharp contrast to other fiscal adjustment cases, decreases for extended periods due to the rise in output and the price level.

On the distribution side, the PMAF regime favors the unskilled even more than pure labor tax adjustment. Government debt, whose real value deteriorates during the transition, is owned only by the skilled. Thus, while both household types' consumption rises due to a smaller increase in the labor tax rate with rising inflation, unskilled consumption rises relatively more. The decrease in consumption inequality leads to a decline in the skill premium in the short run due to the wealth effect on labor supply.

Compared to the BFM approach, the permanent PMAF regime produces qualitatively similar but larger short-run effects. The BFM decomposition is arguably more realistic, as it features temporary rather than permanent monetary accommodation, with a smaller and more controlled inflationary burst.

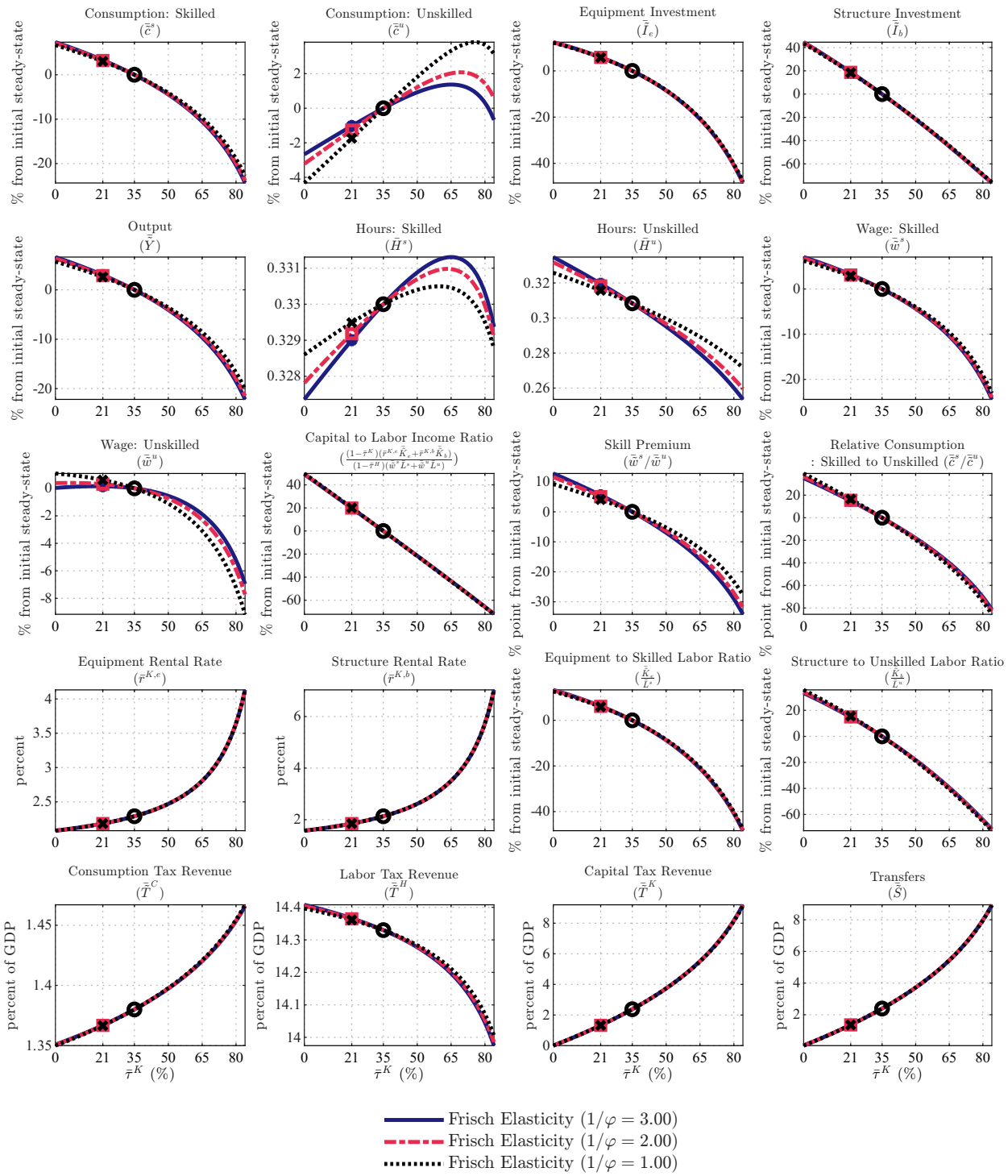
[29] An analogous consumption tax rule, with low enough response to debt, generates similar results and is thus omitted here.

F Appendix tables and figures

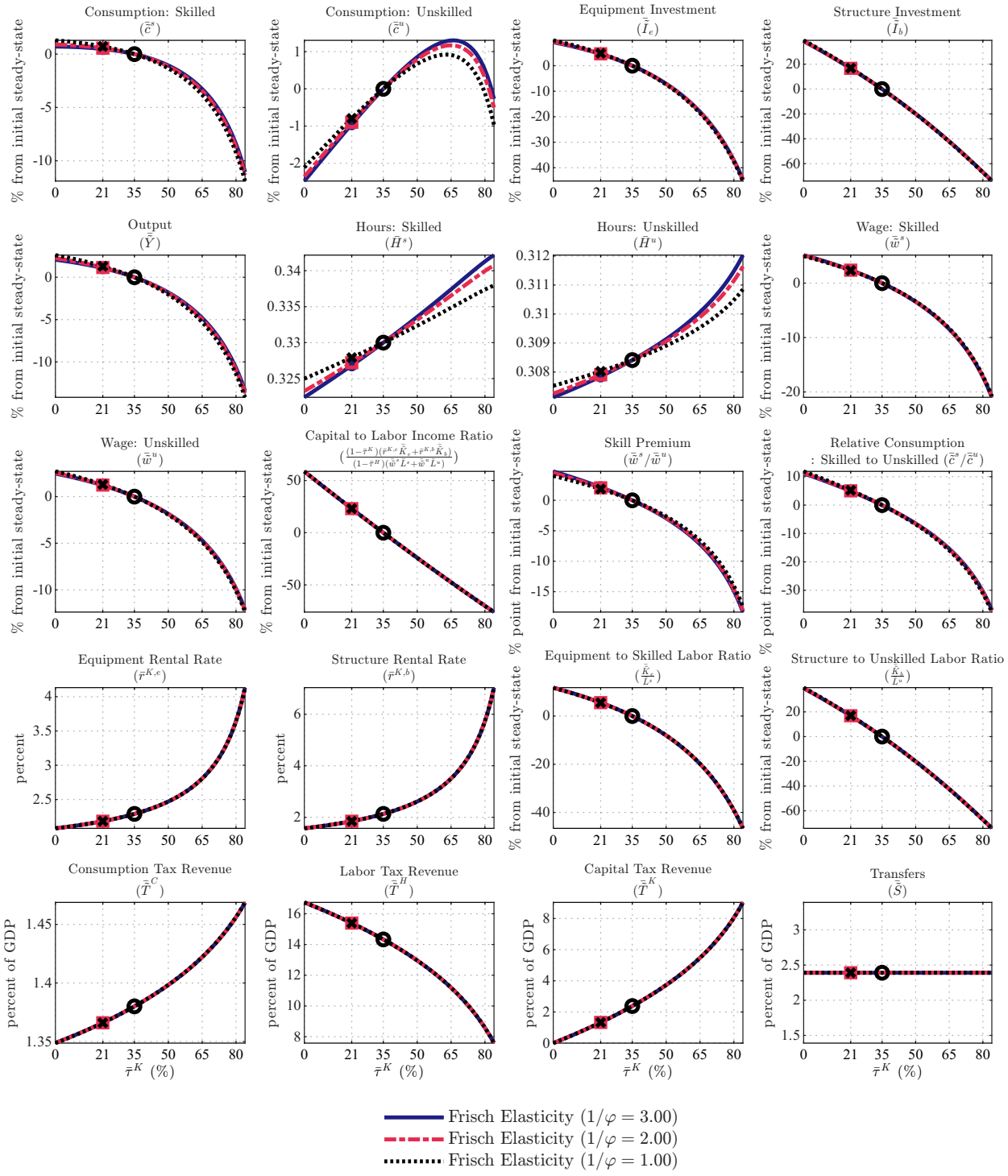
Appendix Table F.1: Estimation results for labor tax rate adjustment rules

	(1) Sample (1983Q1-2002Q4)	(2) Sample (2001Q1-2019Q3)
ρ_1^H	0.869	0.785
	(0.075)	(0.171)
ρ_2^H		0.107
		(0.168)
ψ_B^H	0.111	0.007
	(0.107)	(0.069)
$\psi_{\Delta Y}^H$	0.831	1.821
	(0.633)	(1.473)
ψ_x^H	0.032	0.040
	(0.035)	(0.099)
constant	0.001	-0.002
	(0.003)	(0.001)
R^2	0.832	0.853
Observations	79	75

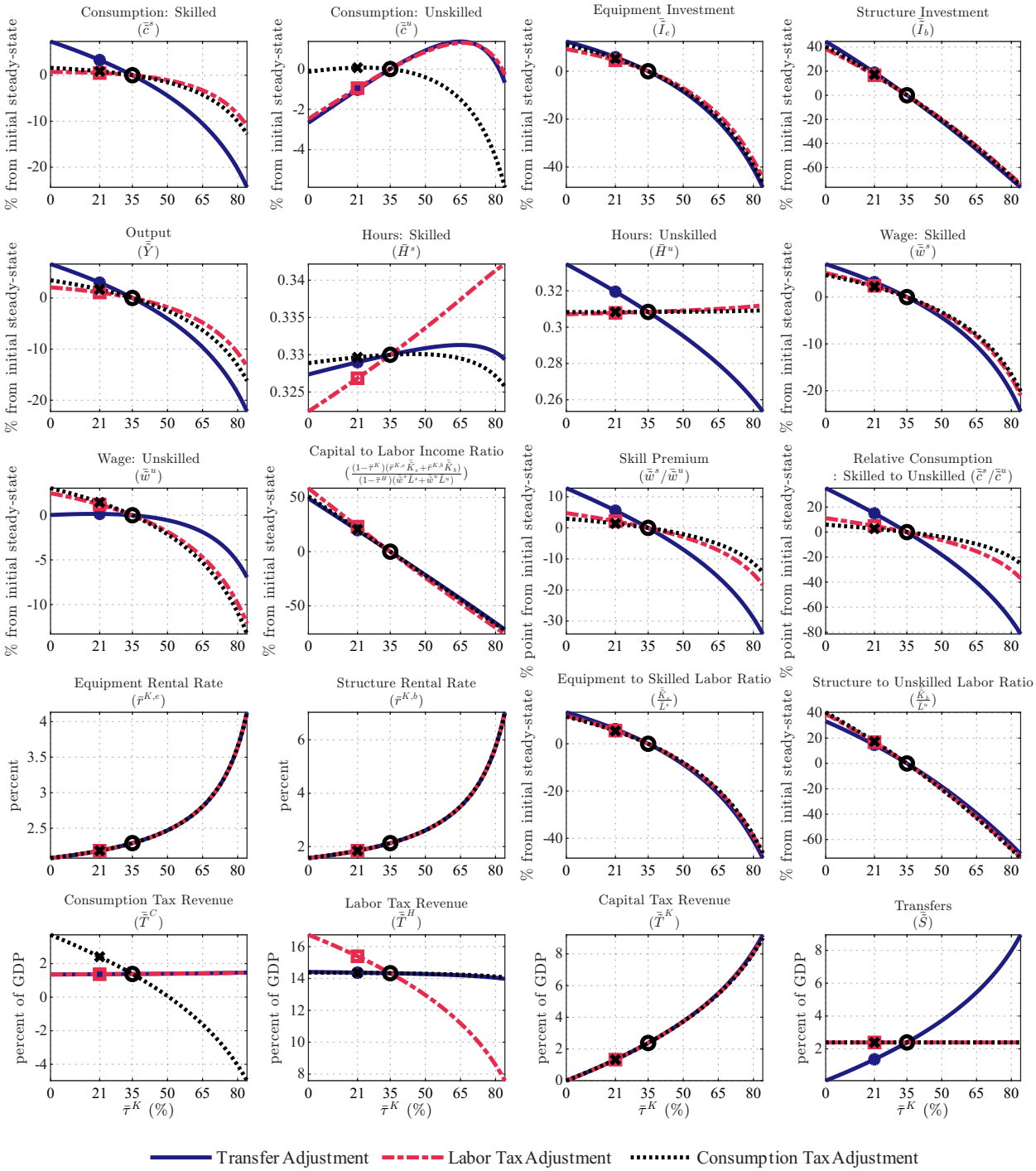
Notes: The table shows OLS estimates of the labor tax rate adjustment rule (D). We use quarterly U.S. data for estimation: tax revenues-to-output ratio, market value of government debt-to-output ratio, output growth, and the gap between actual output and potential output. Column (1) shows the estimation results using the sample from 1983Q1 through 2002Q4, and column (2) shows the estimation results using the sample from 2001Q1 through 2019Q3. For column (1), we drop the second lag of the tax revenues to ensure stationarity of the tax rule. See Appendix D for details.



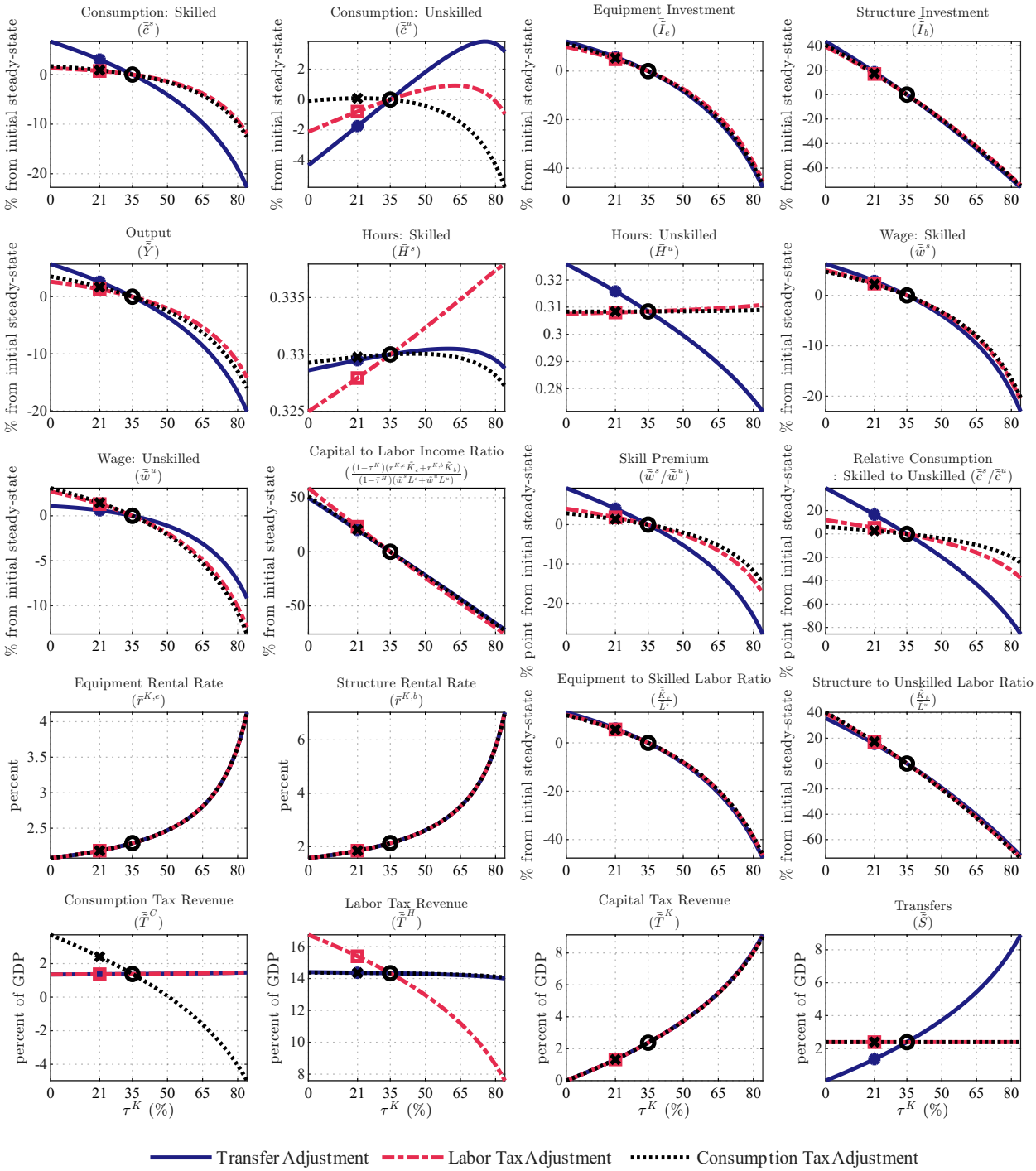
Appendix Figure F.1: Long-run effects of permanent capital tax rate changes under transfer adjustment with different Frisch elasticities



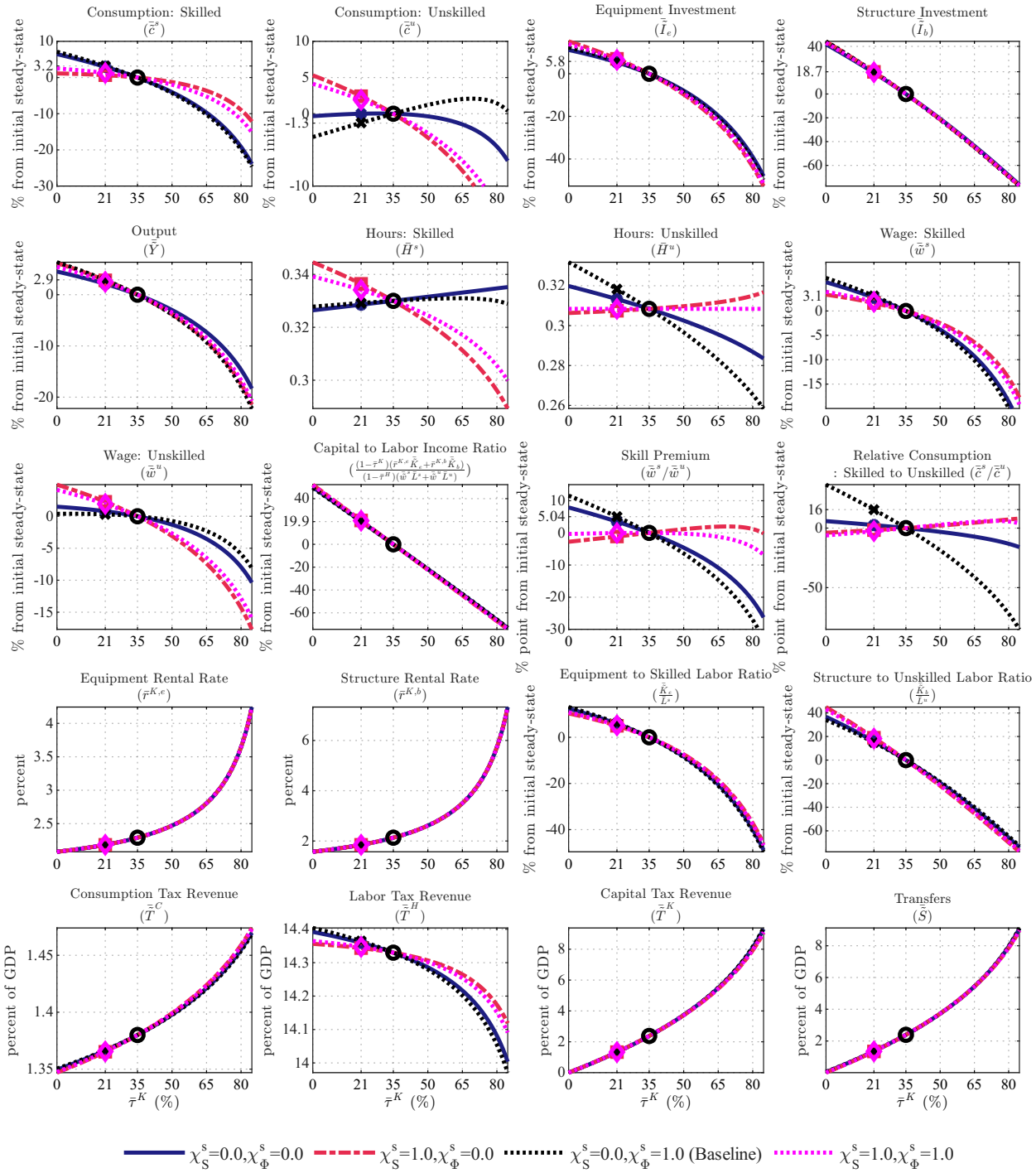
Appendix Figure F.2: Long-run effects of permanent capital tax rate changes under labor tax rate adjustment with different Frisch elasticities



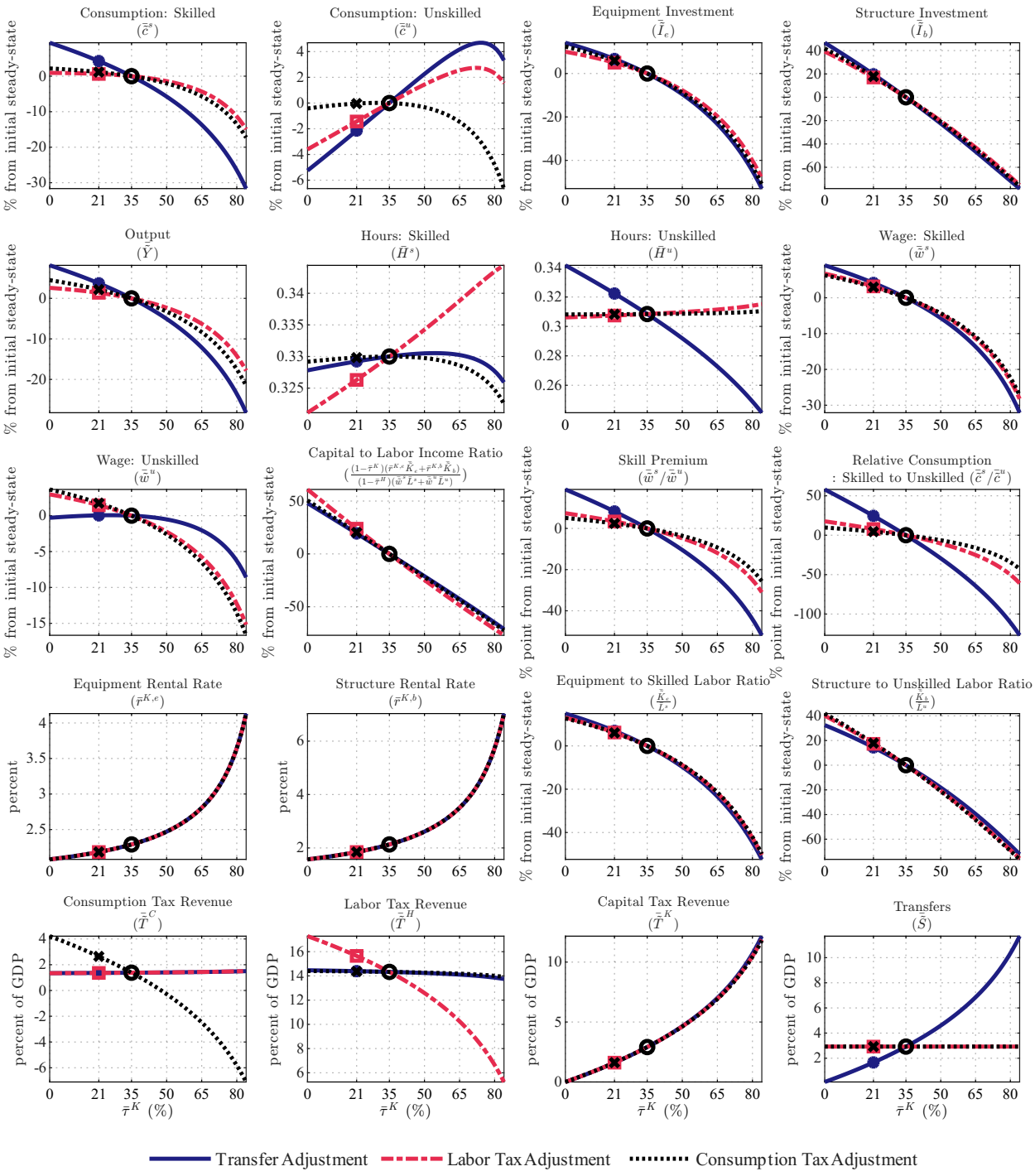
Appendix Figure F.3: Long-run effects of permanent capital tax rate changes under different fiscal adjustments $\left(\frac{1}{\varphi} = 4.0\right)$



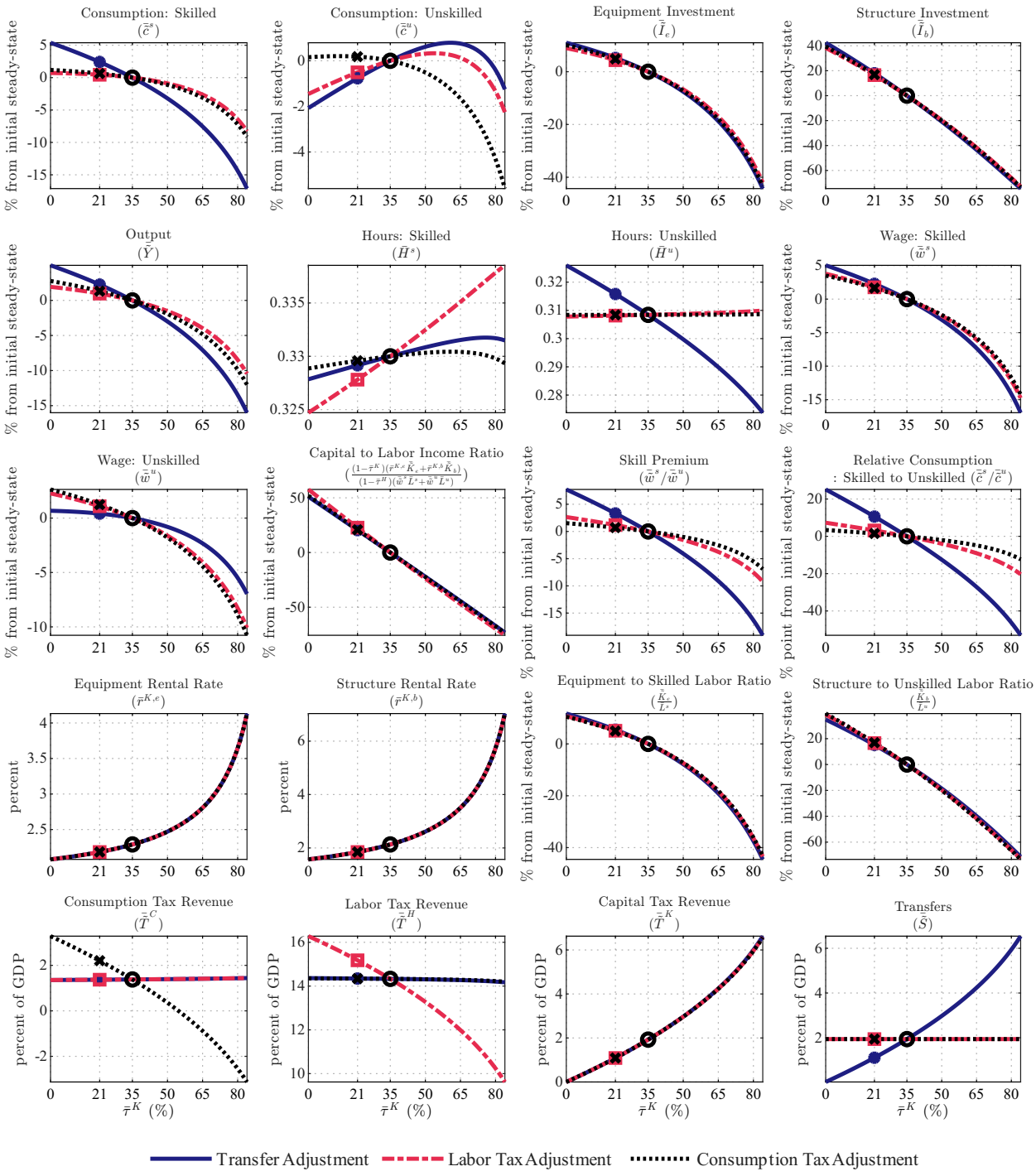
Appendix Figure F.4: Long-run effects of permanent capital tax rate changes under different fiscal adjustments $\left(\frac{1}{\varphi} = 1.0\right)$



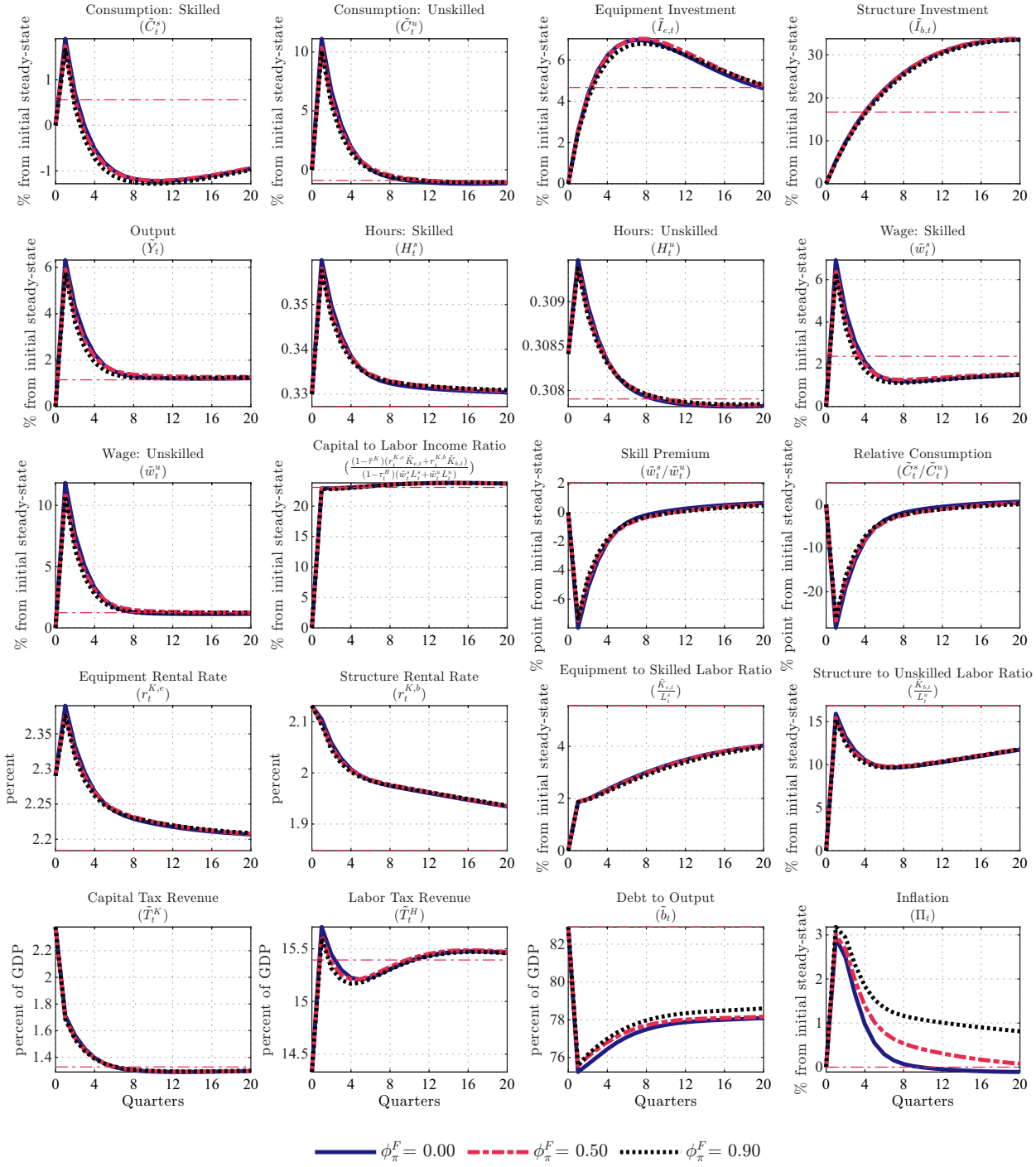
Appendix Figure F.5: Long-run effects of permanent capital tax rate changes under transfer adjustment (different profits and transfer distribution rules)



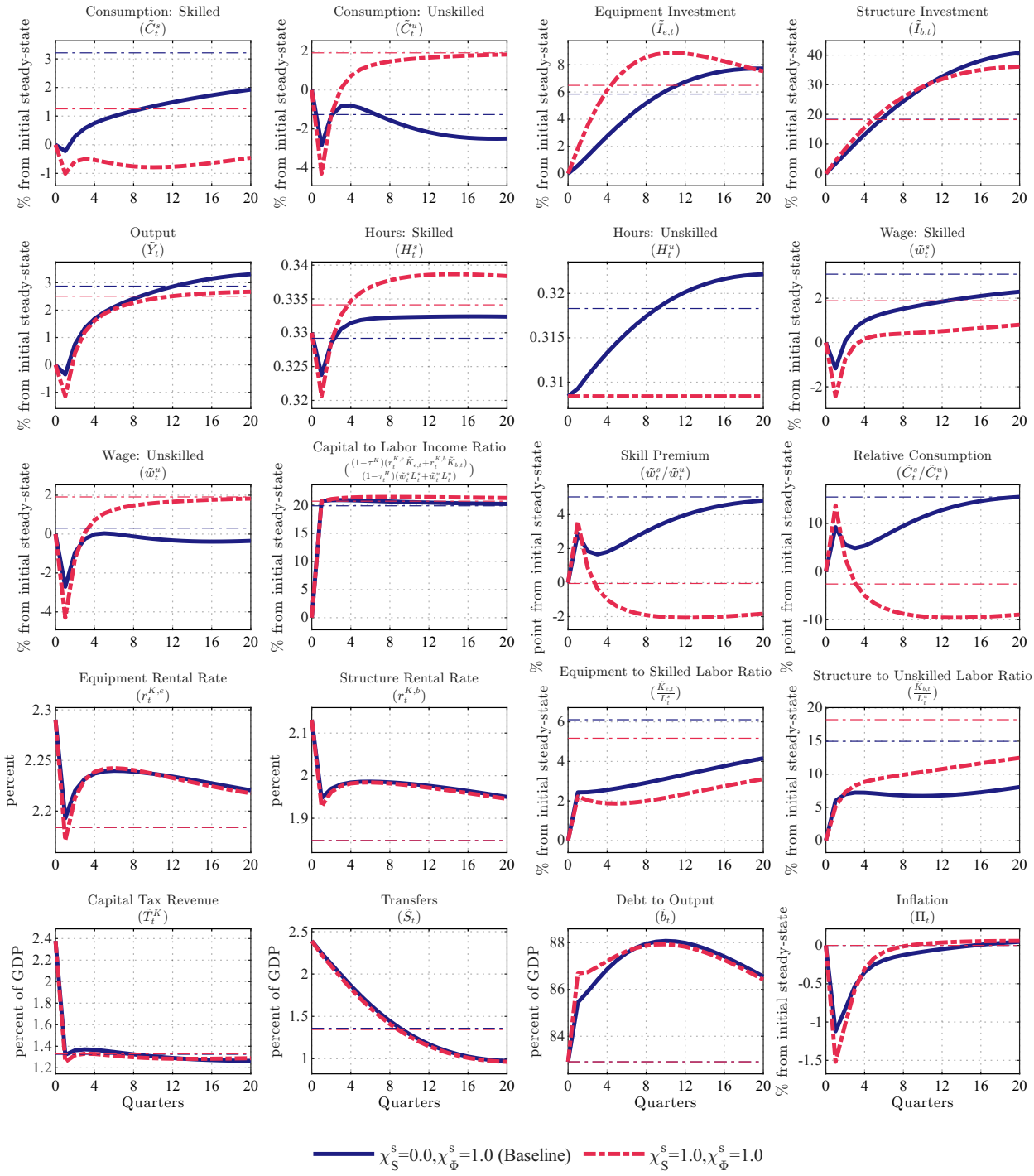
Appendix Figure F.6: Long-run effects of permanent capital tax rate changes under different fiscal adjustments ($\lambda = 0.45$)



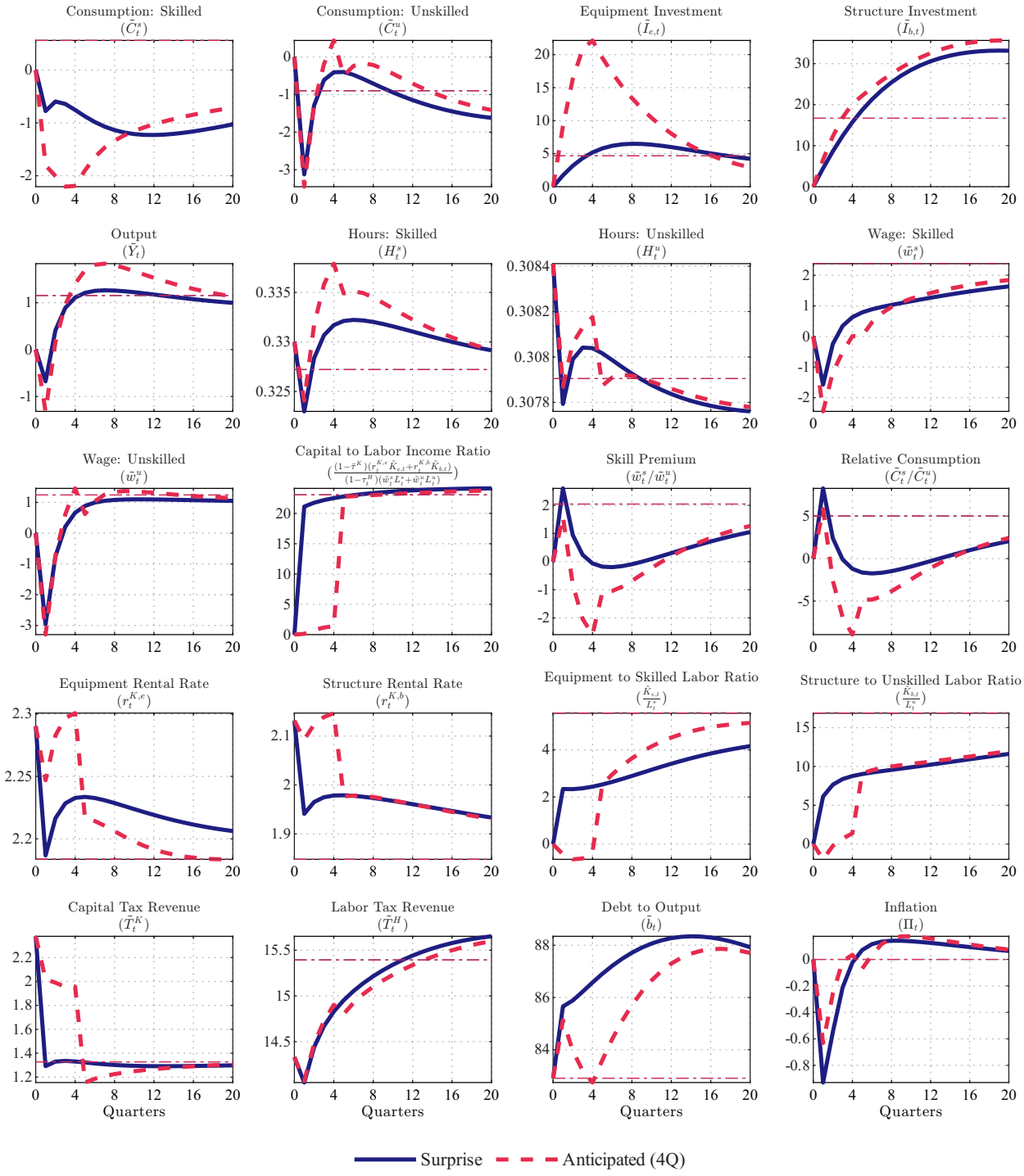
Appendix Figure F.7: Long-run effects of permanent capital tax rate changes under different fiscal adjustments ($\lambda = 0.11$)



Appendix Figure F.8: Transition dynamics of a permanent capital tax rate decrease under labor tax adjustment with BFM monetary accommodation, for different shadow-economy Taylor rule coefficients ϕ_π^F

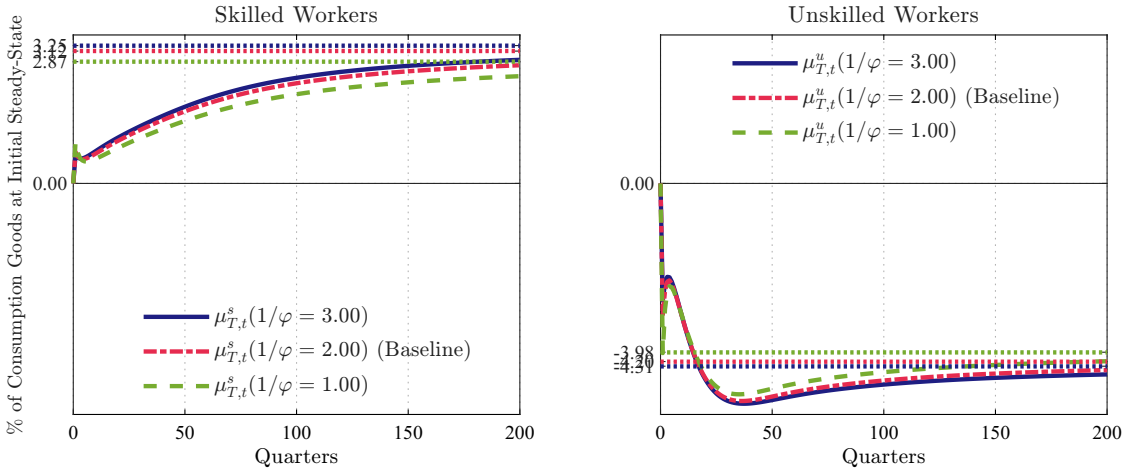


Appendix Figure F.9: Transition dynamics of a permanent capital tax rate decrease under transfer adjustment (different profits and transfer distribution rules)

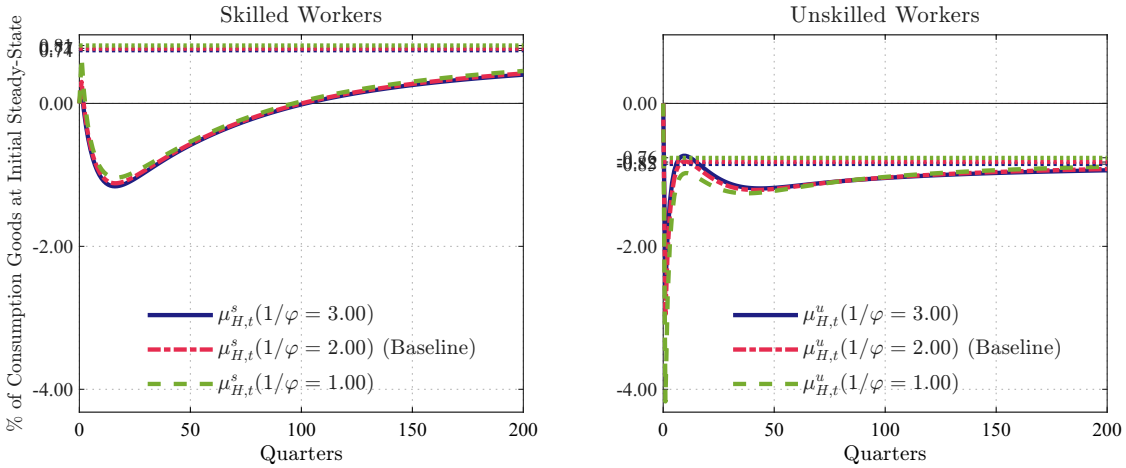


Appendix Figure F.10: Transition dynamics: anticipated tax cut (4 quarters ahead) vs. surprise under labor tax adjustment

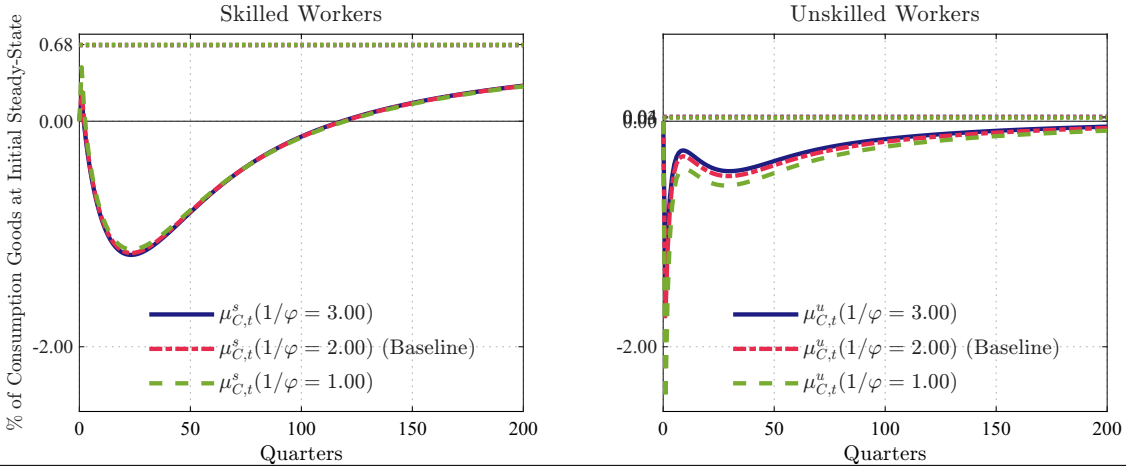
(a) Transfer Adjustment



(b) Labor Tax Rate Adjustment



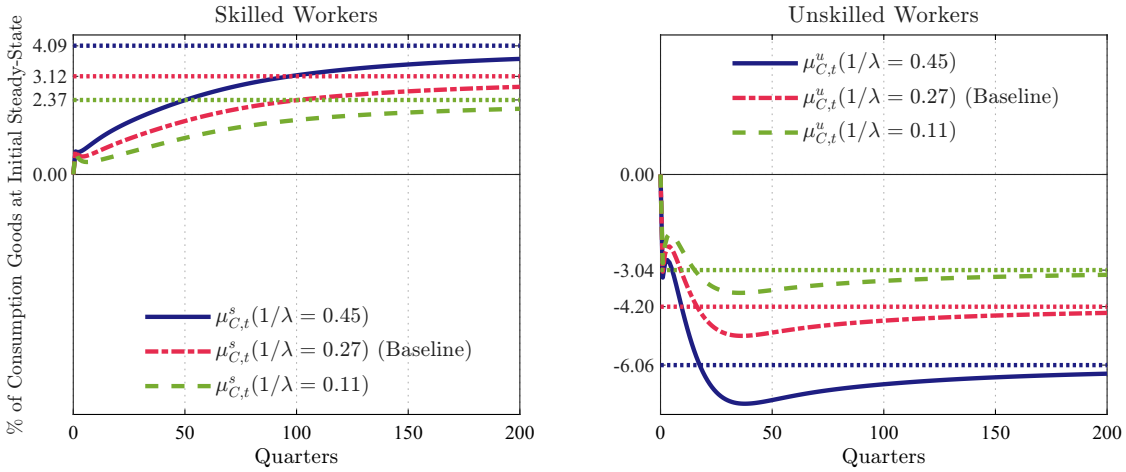
(c) Consumption Tax Rate Adjustment



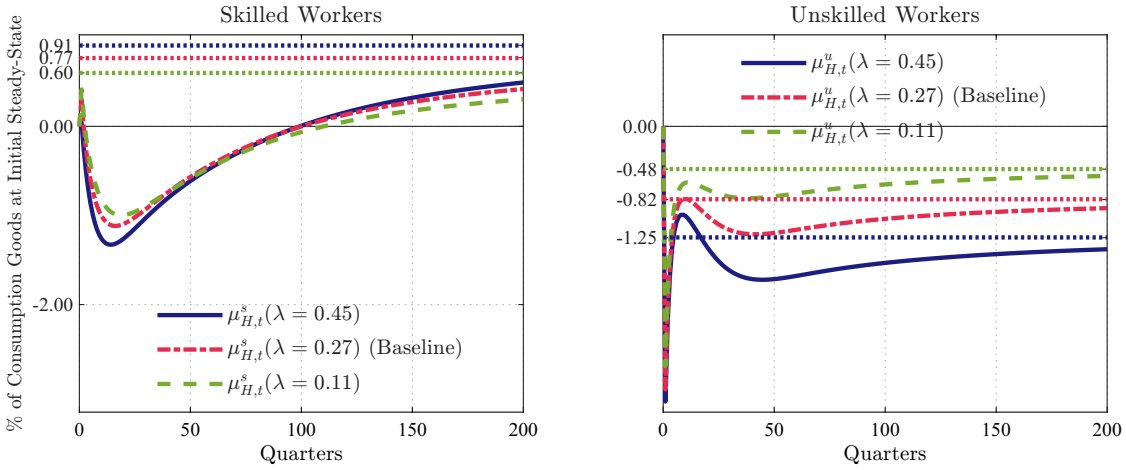
	Transfer adjustment			Labor tax adjustment			Consumption tax adjustment		
	$\frac{1}{\varphi} = 3.0$	$\frac{1}{\varphi} = 2.0$	$\frac{1}{\varphi} = 1.0$	$\frac{1}{\varphi} = 3.0$	$\frac{1}{\varphi} = 2.0$	$\frac{1}{\varphi} = 1.0$	$\frac{1}{\varphi} = 3.0$	$\frac{1}{\varphi} = 2.0$	$\frac{1}{\varphi} = 1.0$
Skilled	3.247	3.122	2.870	0.744	0.766	0.810	0.675	0.676	0.677
Unskilled	−4.314	−4.204	−3.984	−0.846	−0.818	−0.763	0.039	0.037	0.031

Appendix Figure F.11: Welfare with different Frisch elasticities

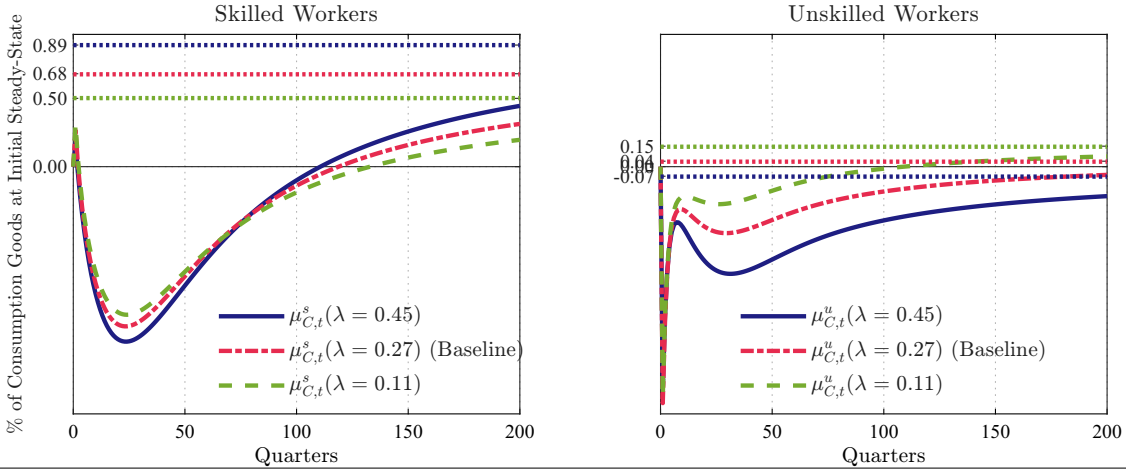
(a) Transfer Adjustment



(b) Labor Tax Rate Adjustment

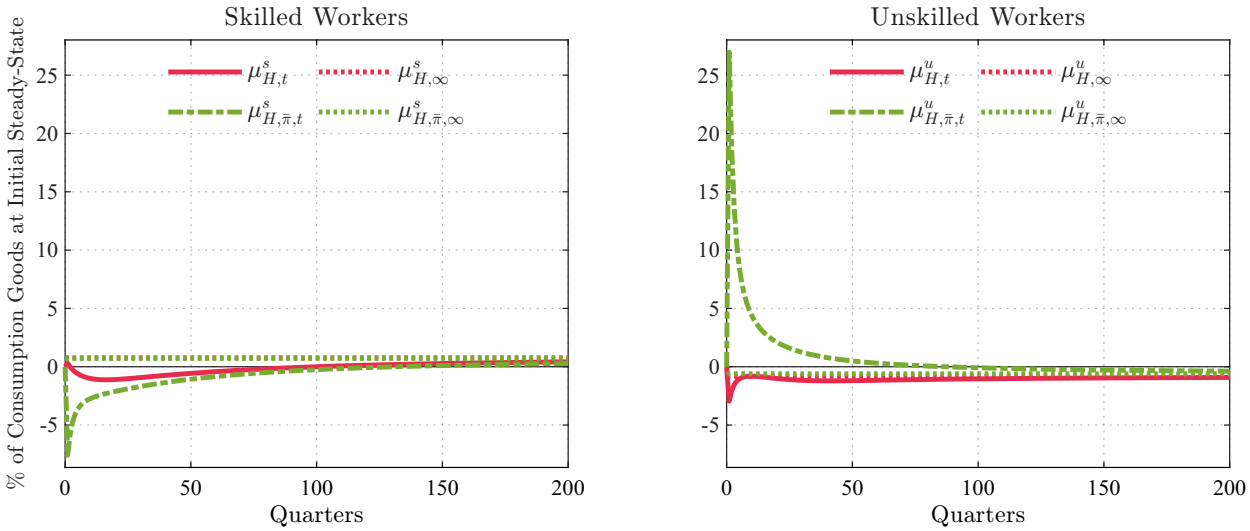


(c) Consumption Tax Rate Adjustment

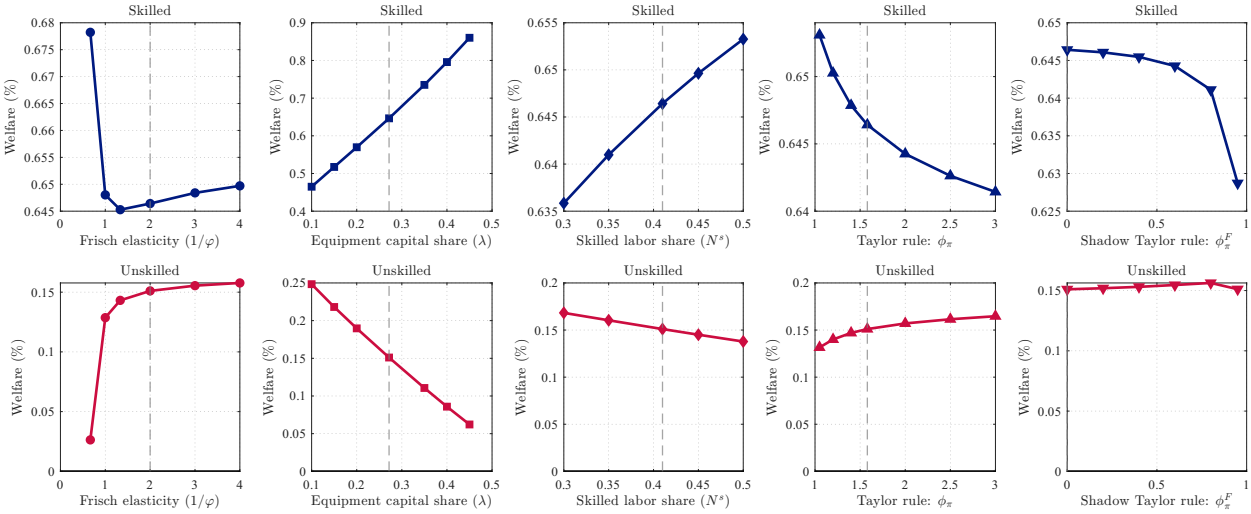


	Transfer adjustment			Labor tax adjustment			Consumption tax adjustment		
	$\lambda = 0.45$	$\lambda = 0.27$	$\lambda = 0.11$	$\lambda = 0.45$	$\lambda = 0.27$	$\lambda = 0.11$	$\lambda = 0.45$	$\lambda = 0.27$	$\lambda = 0.11$
Skilled	4.094	3.122	2.368	0.907	0.766	0.599	0.889	0.676	0.502
Unskilled	−6.060	−4.204	−3.039	−1.246	−0.818	−0.479	−0.073	0.037	0.146

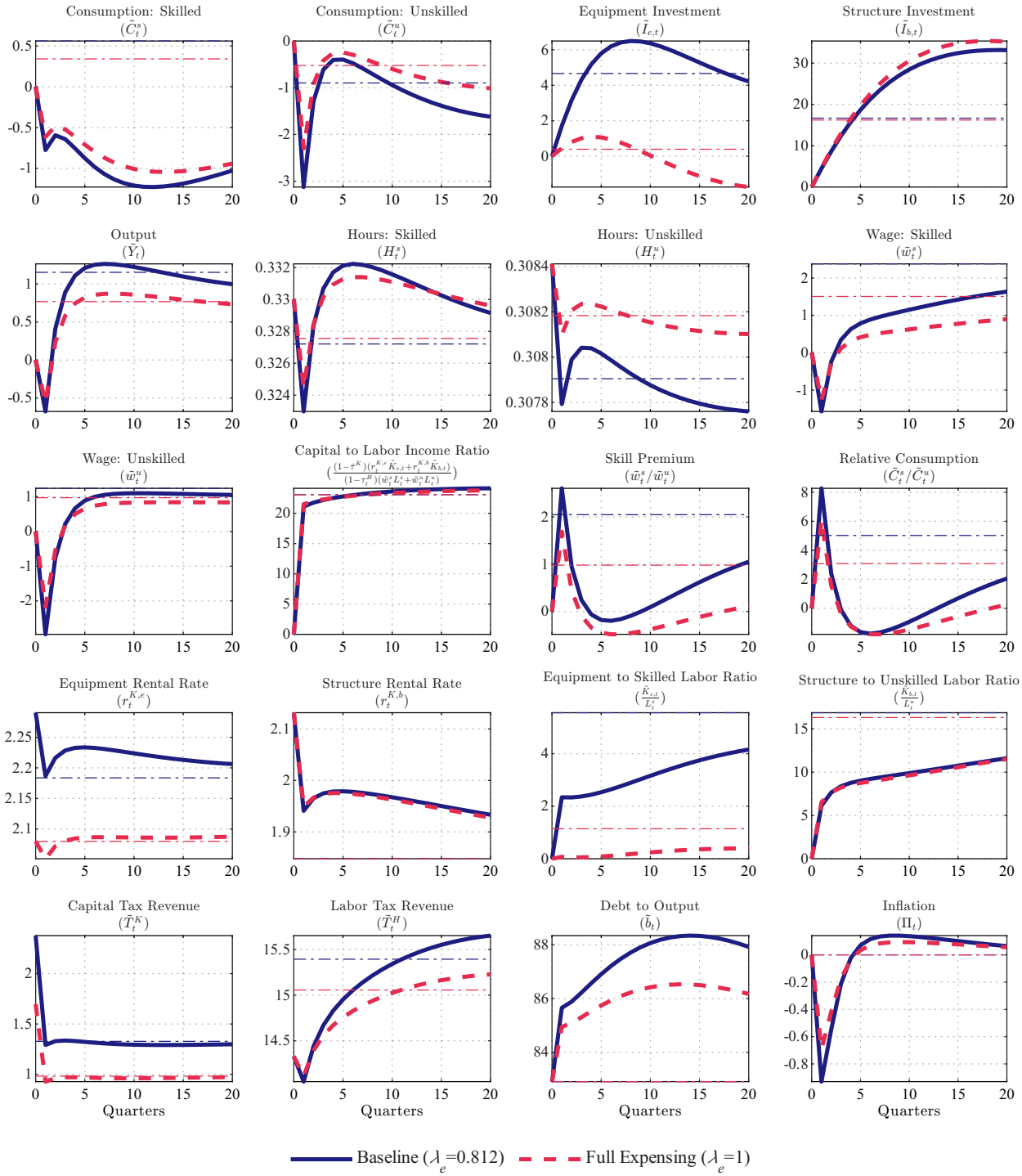
Appendix Figure F.12: Welfare with different equipment capital income share (λ)



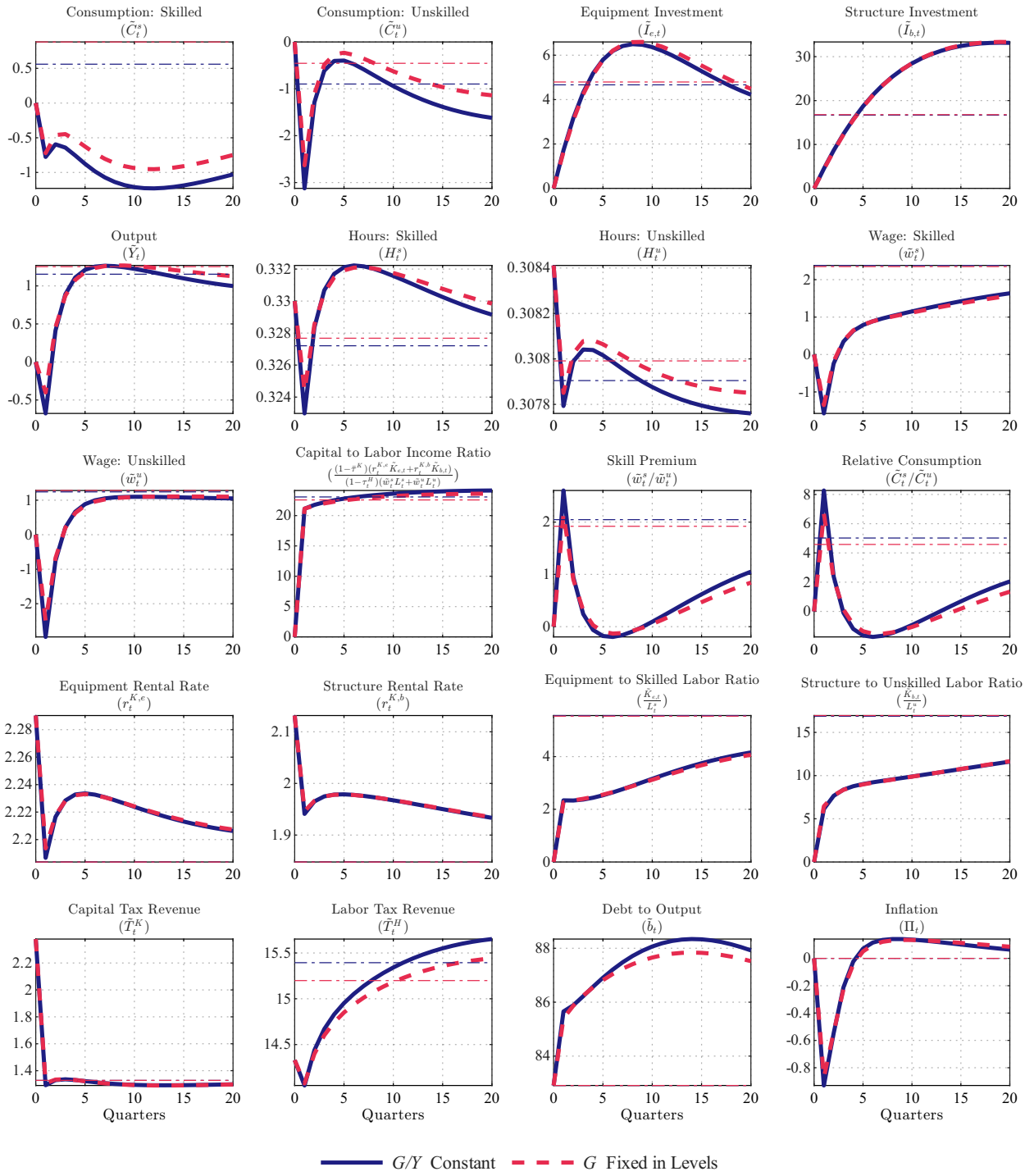
Appendix Figure F.13: Welfare implications under labor tax rate and permanent PMAF



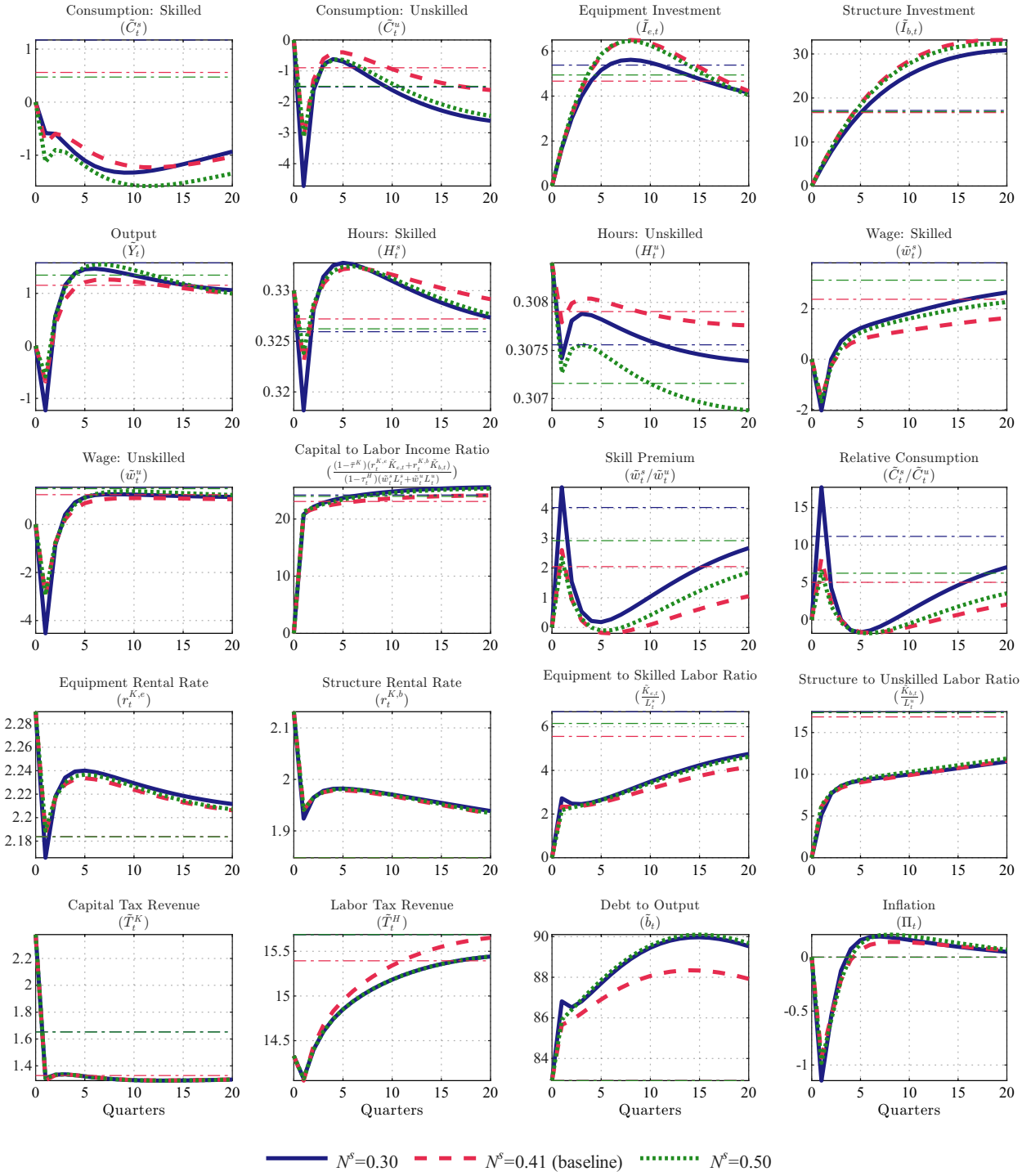
Appendix Figure F.14: Welfare sensitivity for consumption tax financing with BFM



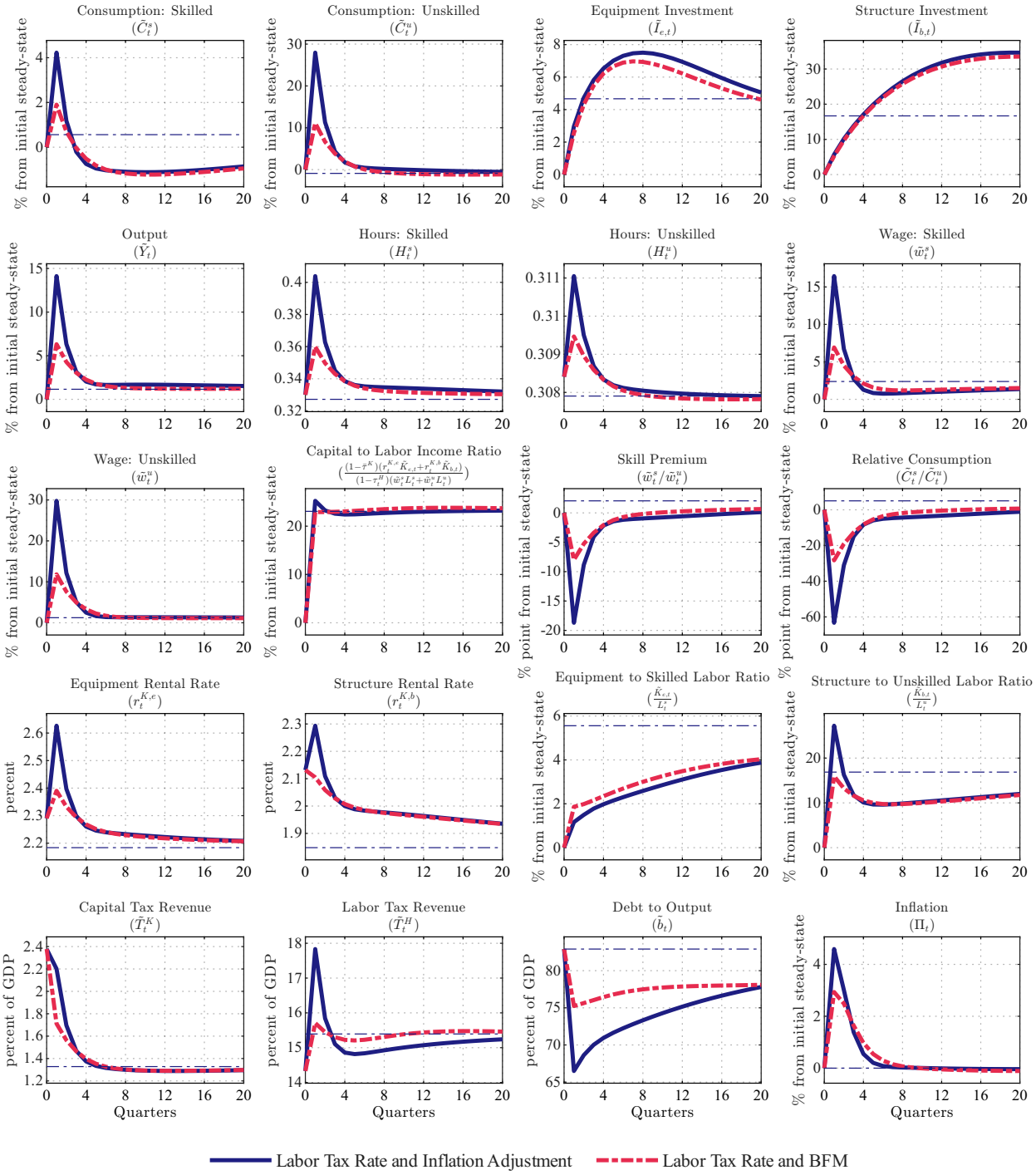
Appendix Figure F.15: Transition dynamics: full expensing ($\lambda_e = 1$) vs. baseline under labor tax adjustment



Appendix Figure F.16: Transition dynamics: government spending fixed in levels vs. constant G/Y under labor tax adjustment



Appendix Figure F.17: Transition dynamics: sensitivity to skilled labor share ($N^s \in \{0.30, 0.41, 0.50\}$) under labor tax adjustment



Appendix Figure F.18: Transition dynamics: permanent PMAF vs. BFM monetary accommodation under labor tax adjustment