Fiscal Financing and Investment Irreversibility: The Role of Dividend Taxation*

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Abstract

We examine the macroeconomic, asset pricing, and public debt consequences of *deficit-financing dividend taxation* in a dynamic general equilibrium model featuring partial investment irreversibility. Dividend taxes interact directly with the occasionally-binding irreversibility constraint, generating *tax-augmented* user-cost and hangover channels that both shape investment and debt-to-output fluctuations and account for a sizeable share of their long-run volatilities. Our analysis further reveals that debt-offsetting dividend tax hikes initially trigger investment inactivity through higher user-costs, followed by a surge driven by intertemporal tax arbitrage and hangover effects. Finally, debt-driven dividend tax rules amplify asset price fluctuations while delivering only modest fiscal revenue changes.

Keywords: Dividend Taxation; Investment Frictions; Asset Prices; Deficit Financing; Public Debt.

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1 Introduction

The sharp rise in public debt following the COVID-19 pandemic and the persistent cost-of-living pressures has reignited debates on the macroeconomic effects of deficit-financing fiscal policies and their implications for debt sustainability. In the U.S., public debt reached approximately 97% of GDP by the end of 2024 and is projected by the Congressional Budget Office to exceed and remain well-above 100% in the coming decades.[1] This growing fiscal burden has intensified the search for policies that can effectively consolidate budget deficits while minimizing adverse effects on employment, private investment, and financial markets. Within academic and policy circles, a contentious issue revolves around whether to implement corporation tax hikes in order to achieve more sustainable public debt levels and a balanced budget. Such tax policy reforms, however, carry the risk of amplifying the frictions already inherent in the (dis)investment process. These frictions include convex (i.e., quadratic, symmetric) and nonconvex capital adjustment costs (Abel and Eberly 1994; Barnett and Sakellaris 1998; Miao and Wang 2014; Chen, Jiang, Liu, Serrato, and Xu 2023). The asymmetric nonconvex costs, in particular, lead to periods of partial investment irreversibility (inaction) followed by investment surges (spikes) – key features of lumpy dynamics (Thomas 2002; Gourio and Kashyap 2007; Baley and Blanco 2021, 2025).

Motivated by the ongoing debate over the distortionary versus debt-stabilizing effects of business tax measures, this paper specifically examines the short- to long-term implications of *deficit-financing dividend taxes* (τ^D) on the macroeconomy, asset prices, and public debt.[2] Consistent with the U.S. Tax Code, dividends represent business profits minus investment expenditures, with investment being exempt from dividend taxes. Corporate profits, on the other hand, are subject to corporate income taxation (τ^π) before investment decisions are made (e.g., Santoro and Wei 2011).[3] While the distortionary and budgetary effects of time-varying corporate income taxes are now well understood in the literature (e.g., Croce, Kung, Nguyen, and Schmid 2012), less attention has been given to dividend taxation as a fiscal consolidation tool, particularly in environments characterized by partial investment irreversibility and rising government debt. This paper fills that gap.[4]

[1] For more details, see https://www.cbo.gov/publication/60870.

[2] Throughout the text, dividend taxes τ^D are interchangeably referred to as payout taxes, distribution taxes, and shareholder taxes. While they constitute a relatively small share of total U.S. federal revenues, their impact on investment, asset prices, and fiscal dynamics can be significant. Thus, they represent an important yet underexplored policy instrument in the context of deficit financing and capital market frictions. For a breakdown of different tax sources in total government revenue, see also https://usafacts.org/articles/how-much-money-does-the-government-collect-per-person/.

[3] As our analysis focuses on the dynamic effects of dividend tax changes, we maintain a constant corporate income tax rate throughout. Dividend taxes differ from corporate income taxes in that they directly affect shareholder returns rather than firms' pre-tax profits. While corporate income taxes primarily influence investment decisions through retained earnings, dividend taxes alter the effective cost of capital and investment by impacting distributions and market valuations (see also Poterba and Summers 1983; McGrattan and Prescott 2005).

[4] Although dividend tax policy is not typically directly linked to public debt in existing institutional frameworks,

We contribute to the public policy and budget solvency debate by developing a real business cycle (RBC) model with deficit-financed government expenditure shocks, a corporation tax schedule, simple fiscal policy rules, convex capital adjustment costs, and an *occasionally-binding partially* irreversible investment constraint – i.e., nonconvex adjustment costs. Specifically, we qualitatively and quantitatively examine the macroeconomic outcomes of shocks that lead to unbalanced fiscal budgets in a model with realistic investment frictions, while allowing τ^D to vary in response to deviations in the public debt-to-GDP ratio (debt ratio henceforth). Devoid of lump-sum transfers, this dynamic general equilibrium framework uncovers novel mechanisms through which distortionary, time-varying, and debt-reducing dividend tax policies influence corporate and household decisions, as well as government deficits and debt.[5]

The key friction in this setup is the occasionally-binding partial irreversibility constraint that prevents investment from falling below a certain fraction of steady-state investment (e.g., Guerrieri and Iacoviello 2015). This constraint generates a variable wedge between the tax-adjusted stock market valuation of capital given by $(1-\tau^D)$ and the marginal price of capital – Tobin's (1969) q. We refer to this wedge as the *irreversibility shadow value.* Since the seminal theoretical contributions of Abel and Eberly (1994, 1996, 1999), Bertola and Caballero (1994), and Dixit and Pindyck (1994), subsequent empirical investigations have revealed that various irreversibility friction measures are economically and statistically significant (see Chirinko and Schaller 2009 and references therein). In a recent contribution, Baley and Blanco (2025) analyze the role of irreversibility in a parsimonious investment model with heterogeneous firms and derive sufficient statistics that characterize aggregate capital dynamics. Instead, we incorporate partial irreversibility into a general equilibrium framework that features shareholder taxes and an *endogenous* wedge between the internal and external price of capital. Our paper highlights the importance of this interpretable wedge in shaping macroeconomic dynamics under counterfactual debt-reducing payout tax policy rules. Importantly, Hayashi's (1982) conditions apply in our framework such that the marginal and average q are coequal, with or without the irreversibility constraint.[6] This equality enables us to use the observable average q and the effective dividend tax rate time-series data, drawn from

historical precedents show that dividend tax hikes have been used in response to fiscal pressures. For example, the American Taxpayer Relief Act of 2012 raised the top dividend tax rate from 15% to 20% to help avert the fiscal cliff, illustrating that dividend taxation can also serve as a potential fiscal stabilization tool. Given recent public debt pressures, this precedent supports our counterfactual narrative, which explores the macroeconomic and budgetary effects of such policies, particularly under partial investment irreversibility.

[5] Our framework abstracts from institutional details of dividend taxation, such as differential treatment of residents and foreigners, personal income tax (PIT) obligations, and tax treaties that cap dividend tax rates. We also do not model dividend imputation systems or deemed distributions, as our focus is on the macroeconomic effects of dividend tax adjustments rather than their administrative implementation.

[6] The Hayashi (1982) conditions are met through: *i)* perfect competition – constant-returns-to-scale (CRS) production functions; *ii)* the proportionality of profits to the capital stock; and *iii)* the homogeneity of the convex adjustment costs with respect to capital and investment.

McGrattan (2023), to approximately estimate the probability of the partial irreversibility friction binding in the U.S. nonfinancial corporate data. Under all the fiscal policy regimes examined, the frequency of the constraint binding in the model is comparable to its implied empirical counterpart.

Our main sets of findings can be summarized as follows. First, a temporary, debt-driven, hump-shaped increase in the dividend tax rate amplifies investment irreversibility, triggering a bust-boom cycle in investment following positive government spending or adverse technology shocks that raise debt ratios and lower asset prices. Similar to Baley and Blanco (2021, 2025), we also compute investment cumulative impulse responses (CIRs) and find that the interaction between dividend taxes and the irreversibility shadow value increases the CIR relative to models without irreversibility or payout taxation, implying greater persistence of aggregate fluctuations. We explicitly identify several key mechanisms that drive these outcomes:

i) **Intertemporal dividend tax arbitrage channel** – arises independently of investment irreversibility and influences firms' payout and investment decisions via future expectations. While an expected tax hike, on its own, can incentivize firms to reinvest retained earnings and limit payouts (e.g., Korinek and Stiglitz 2009; Gourio and Miao 2011; Ghilardi and Zilberman 2024), this effect is dampened or even overturned in the short-run as falling asset prices and rising interest rates raise the cost of capital and discourage investment – consistent with the Jorgenson (1963) user-cost framework. Over time, as the tax rate peaks and then declines, firms anticipate lower future tax burdens and easing financing conditions, leading to an investment rebound. Given this tight link to the Jorgenson effect, we refer to the net impact of the tax arbitrage channel as the *interest rate-adjusted tax arbitrage channel*.

ii) **Tax-augmented user-cost channel** – captures the effects of the *expected* shadow value of the irreversibility constraint – expressed as a fraction of the stock market valuation of capital – on investment. More concretely, the user-cost irreversibility effect arises when the anticipation of a future binding constraint discourages current investment by increasing the value of delaying capital installation. A debt-driven payout tax hike increases the user-cost-of-capital, with irreversibility amplifying this effect by preventing firms from downsizing their capital stock. However, the investment inactivity period is short-lived, as firms anticipate a decline in shareholder taxes and improved financing conditions that lower the cost of capital and allow investment to recover.

iii) **Tax-augmented hangover channel** – emerges when the irreversibility constraint binds, making future capital dependent on past capital accumulation. This mechanism is reflected through the impact of the *current* shadow value of irreversibility – expressed also as a fraction of the stock market valuation of capital – on investment. When past investments lead to excess capital and low marginal profitability, irreversibility prevents firms from downsizing in response to adverse conditions. As the tax burden peaks, firms remain constrained by their existing capital stock.

However, once taxes decline and depreciation gradually erodes the capital overhang, investment rises in the medium- to long-term. The tax-adjusted hangover effect leads to an investment rebound and is further reinforced by the interest rate-augmented intertemporal tax arbitrage channel.

While the user-cost and hangover channels associated with irreversibility are well-established in the literature (e.g., Bertola and Caballero 1994; Abel and Eberly 1999), our main contribution lies in revealing their unique interplay with dividend taxation, which gives rise to newly defined and rescaled *tax-augmented* channels. Analyzing these mechanisms provides a rich framework for understanding how firms respond to temporary debt-driven shareholder tax changes. Using a variance-covariance decomposition, we additionally show that under an active dividend tax policy rule, tax-adjusted irreversibility mechanisms can account for nearly 30% of investment and debt ratio volatilities in response to stochastic simulations driven by estimated government spending and technology shocks. This sizeable contribution highlights the relevance of dividend taxation for fiscal policy design, especially in environments with investment frictions.

A second key set of results, building on insights above, is that raising τ^D following an increase in public debt – triggered by a positive deficit-financed government spending shock – increases net cumulative present-value output and investment multipliers in the longer-term. This effect is driven by the strength of the tax-adjusted hangover and intertemporal dividend tax arbitrage channels. We directly show that the tax-augmented hangover effect significantly increases the net cumulative present-value of the investment spending multiplier over the longer horizon. Complementing the works of Alesina, Favero, and Giavazzi (2019) and Dávila and Hébert (2023), our framework suggests that adopting a dividend tax-based approach to fight rising budget deficits and excessive government debt can be less costly in terms of longer-term output losses. However, as temporary τ^D changes directly distort the wedge between external and internal capital valuations, they lead to increased asset price volatility. Importantly, stronger payout tax rules that respond to rising debt ratios result in a more significant decrease in equity prices.

A third salient result is the trade-off between public debt stabilization and private investment distortions following the implementation of the dividend tax policy rules. As mentioned above, corrective dividend tax hikes can lead to short-term investment inactivity, followed by a surge in the longer-run. This lumpy investment pattern is amplified when the payout tax rule is more sensitive to deviations in the debt ratio. Nonetheless, regarding debt management, our findings suggest that a more stringent contemporaneous response to public debt within the tax rule moderates the increase in the debt ratio, although the magnitude of this change remains relatively small. Intuitively, the sharp decline in asset prices and net distributions following the tax hike limits the boost to fiscal revenues. Further, we find that debt stabilization is slower in a model featuring investment irreversibility frictions compared to a standard RBC framework. Thus, the value of austerity measures enacted through payout tax rises should be carefully assessed against their distinct and distortionary real economic and asset pricing outcomes. These insights are particularly relevant for high-debt economies grappling with ongoing fiscal pressures.

Finally, to underscore the importance of shareholder taxes in shaping business cycle, asset price, and public debt fluctuations under costly reversibility, we compare the model dynamics under such tax rules with those of a model where long-run fiscal sustainability is obtained through nondistortionary lump-sum tax modifications. We also examine alternative tax policy specifications within a standard frictionless RBC model, and conclude that the irreversibility shadow value is key to understanding the broader impacts of fiscal policies, particularly dividend taxes.

Related Literature. — Our article builds upon and extends several strands of literature. We contribute to the voluminous body of research investigating the links between government policies, economic activity, and public debt in stochastic RBC models. Previous studies by Leeper and Yang (2008); Leeper, Plante, and Traum (2010); Drautzburg and Uhlig (2015); Traum and Yang (2015); Sims and Wolff (2018); Fotiou, Shen, and Yang (2020) have primarily focused on the macroeconomic consequences of deficit-financing *personal* tax policy rules. In contrast, our emphasis lies in exploring the business cycle and asset price implications of debt-reducing *corporate payout* tax policies within a model featuring asymmetric nonconvex investment costs. While McGrattan and Prescott (2005); Santoro and Wei (2011); Gourio and Miao (2011); Miao and Wang (2014); Chang, Kuo, Lin, and Yang (2023); Ghilardi and Zilberman (2024) do examine the aggregate effects of various business taxes, these papers abstract from the interactions of such taxes with public debt management.

An important exception includes Croce, Kung, Nguyen, and Schmid (2012), who analyze corporate profit tax financing regimes and their effects on business cycles, equity returns, and government deficits. Our contribution to this work involves analyzing counterfactual dividend tax rules in a model with endogenous investment regime switching. More specifically, the occasionally-binding nature of the investment irreversibility constraint reflects the presence of distinct investment regimes, where firms alternate between constrained and unconstrained investment behavior depending on economic conditions. While our framework emphasizes irreversibility constraints, this modeling approach is in the spirit of Ghilardi and Zilberman (2024), who highlight the role of investment credit limits in shaping dynamic investment responses to shareholder tax adjustments. In the present model, dividend taxes yield nontrivial short- and long-term implications for firm investment, as well as equity prices and public debt dynamics due to their tight interactions with the occasionally-binding irreversibility friction.

We also engage with the literature that examines the relative importance of investment irreversibility and, more broadly, lumpy investment in explaining business cycle and asset price fluctuations within general equilibrium models (e.g., Sargent 1980; Dow and Olson 1992; Coleman 1997; Faig 2001; Kogan 2001, 2004; Thomas 2002; Veracierto 2002; Gourio and Kashyap 2007; Bachmann, Caballero, and Engel 2013; Lanteri 2018; Winberry 2021).[7] Extending this line of research, we analyze how various debt-offsetting dividend tax policies interact with an occasionally-binding irreversibility friction wherein macro-level investment does not need to reach zero for the constraint to frequently bind. While Thomas (2002) and Veracierto (2002) suggest virtually-zero impact of micro-level lumpiness on aggregate dynamics, our approach, following Guerrieri and Iacoviello (2015), highlights that the current and expected shadow costs of partial irreversibility play a key role in shaping macroeconomic fluctuations following aggregate shocks and fiscal policy adjustments (see also Ramey and Shapiro 1998; Gourio and Kashyap 2007; Bachmann, Caballero, and Engel 2013; Winberry 2021). To ensure tractability, we retain the representative-agent framework that captures heterogeneity through the endogenous and occasionally switching investment regimes faced by the 'average firm'.[8] The relationship between government policies and the tightness of the irreversibility friction also significantly influences asset price dynamics, thereby complementing Kogan's (2004) work by incorporating shareholder tax considerations.

Finally, Faig and Shum (1999); Altug, Demers, and Demers (2009); Miao (2019); Chen, Jiang, Liu, Serrato, and Xu (2023) stand out as notable studies examining the interplay between partial irreversibility and either corporate income tax or investment tax/subsidy policies. Our primary contribution relative to these articles lies in introducing public debt and deficit factors within a tractable dynamic general equilibrium framework. This enables a deeper exploration of the trade-off between investment-asset pricing distortions and fiscal sustainability following the implementation of payout tax policies.

Outline. — The paper proceeds as follows. Section 2 describes the model with a detailed account of the corporate firm's investment decision and how it is influenced by the irreversibility constraint and payout taxation. Section 3 explains the calibration and estimation of the model. Section 4 illuminates the main sets of results outlined above. Section 5 concludes. Given the

[7] For partial equilibrium canonical investment models featuring nonconvexities and irreversibility constraints, see Demers (1991); Bertola and Caballero (1994); Dixit and Pindyck (1994); Abel and Eberly (1994, 1996, 1999); Barnett and Sakellaris (1998); Holt (2003); Bloom, Bond, and Van Reenen (2007); Caggese (2007); Chirinko and Schaller (2009); Baley and Blanco (2025).

[8] Essentially, we complement the micro-level lumpy investment literature by allowing partial irreversibility to occasionally arise at the aggregate level, contingent on the size and direction of aggregate shocks and fiscal policies. This approach differs from tracking the cross-sectional distribution of firm-level investment but remains empirically relevant, as investment lumpiness has also been documented at the aggregate level (e.g., Fiori 2012). The representative-firm framework enables us to isolate key investment mechanisms in a tractable manner without introducing additional heterogeneity that could obscure these effects. Given that the model already includes two endogenous state variables – physical capital and public debt – extending it to capture the time-varying distribution of heterogeneous firms and regime shifts within the distribution would introduce substantial additional computational complexity. While challenging, such an extension could offer valuable insights and remains a promising direction for future research.

model's focus on fiscal financing via dividend taxation, we relegate the impulse response analysis of adverse technology shocks – and their interaction with dividend taxes, public debt, and investment irreversibility – to the Appendix.

2 The Model

Consider an infinite-horizon discrete-time economy populated by a continuum of measure one of identical households-shareholders, perfectly-competitive corporate firms, and a government.

2.1 Households

Households derive utility from consumption (C_t) and disutility from labor (N_t) according to the following separable utility function:

$$U\left(C_t, N_t\right) = E_0 \sum_{t=0}^{\infty} \beta^t \left[\frac{C_t^{1-\gamma} - 1}{1-\gamma} - hN_t\right], \tag{1}$$

where E_0 represents the expectation operator, $\beta \in (0,1)$ is the discount factor, $\gamma^{-1} > 0$ is the intertemporal elasticity of substitution of consumption, and $h > 0$ is the weight attached to the linear disutility from labor. In this environment, labor N_t represents the fraction of household members that work as in Hansen (1985).

Working households receive a wage rate W_t. Ownership of the firm's stocks S_t, which pay a price per share of p_t, entitles the shareholder to earn an after-tax dividend per share of $\bar{D}_t \equiv \left(1 - \tau_t^D\right) D_t$. Here, τ_t^D stands for the dividend tax rate, and D_t is the dividend net of corporate income tax, as defined below. At the beginning of the period, households also purchase one-period government bonds B_t paying $R_{t+1}B_{t+1}$ units of goods in period $t+1$, where R_t is the gross real interest rate. Denoting $T_t \geq 0$ as lump-sum taxes, the flow budget constraint is:

$$C_t + p_t S_{t+1} + B_t \leq W_t N_t + \left[\left(1 - \tau_t^D\right) D_t + p_t\right] S_t + R_{t-1}B_{t-1} - T_t. \tag{2}$$

For $S_t > 0$, and taking taxes, dividends, equity prices, the bond interest rate, and the wage rate as given, maximization of (1) subject to (2) yields the respective first-order conditions with respect to C_t, S_{t+1}, B_t, and N_t:

$$U_{C,t} \equiv \Lambda_t = C_t^{-\gamma}, \tag{3}$$

$$p_t = \beta E_t \frac{C_{t+1}^{-\gamma}}{C_t^{-\gamma}} \left[\left(1 - \tau_{t+1}^D\right) D_{t+1} + p_{t+1}\right], \tag{4}$$

$$1 = \beta E_t \frac{C_{t+1}^{-\gamma}}{C_t^{-\gamma}} R_t, \tag{5}$$

$$C_t^{-\gamma} W_t = h. \tag{6}$$

The Lagrange multiplier on the budget constraint Λ_t represents the marginal utility of consumption, as shown through equation (3). Conditions (4) and (5) are typical Euler equations with respect to firm equity and government bonds, respectively. Condition (6) determines the optimal indivisible labor supply that varies along the extensive margin.

Combining (4) and (5) yields a no-arbitrage condition between the two financial assets, $E_t R_{t+1} = E_t R_{t+1}^S$, with the after-tax return to equity between periods t and $t+1$ defined as $R_{t,t+1}^S \equiv \left[\left(1 - \tau_{t+1}^D\right) D_{t+1} + p_{t+1}\right] / p_t$. Thus, the ex-dividend share price can be written as:

$$p_t = \frac{\left[\left(1 - \tau_{t+1}^D\right) D_{t+1} + p_{t+1}\right]}{R_{t,t+1}}. \tag{7}$$

Equation (7) shows that the stock price is negatively related to the expected return on government bonds, and positively linked to future net dividend payouts and expected share prices. Finally, to rule out the over-accumulation of government debt and firm equity, the transversality conditions $E_t \lim_{s\to\infty} \beta^{t+s} U_{C,t+s} B_{t+s} = 0$ and $E_t \lim_{s\to\infty} \beta^{t+s} U_{C,t+s} S_{t+s} = 0$ must hold in equilibrium.

2.2 Firms: Production, Business Taxes, and Investment Policy

A representative corporate firm hires labor N_t, owns the predetermined capital stock K_{t-1}, and combines these two inputs to produce output Y_t according to the following constant-returns-to-scale (CRS) technology:

$$Y_t = A_t K_{t-1}^{\alpha} N_t^{1-\alpha}, \tag{8}$$

with $\alpha \in (0,1)$ standing for the share of capital in production. Total factor productivity (TFP) A_t follows an $AR(1)$ process:

$$\ln(A_t) = \rho_A \ln(A_{t-1}) + \varepsilon_{A,t}, \tag{9}$$

where $\rho_A \in (0,1)$ is the degree of persistence, and $\varepsilon_{A,t} \sim i.i.d.\mathcal{N}\left(0, \sigma_A^2\right)$.

The firm makes investment I_t to raise its existing capital stock according to:

$$K_t = (1-\delta) K_{t-1} + I_t, \tag{10}$$

where $\delta \in (0,1)$ is the capital depreciation rate.

To model partial investment irreversibility, we follow the specific formulation used in Guerrieri and Iacoviello (2015) wherein investment cannot fall below a fixed fraction of long-term investment. The occasionally-binding irreversibility constraint takes the form:

$$I_t \geq \phi I, \tag{11}$$

with $I = \delta K$ denoting the steady-state investment level and $\phi \in (0, 1)$ measuring the degree of irreversibility.[9] When $\phi = 0$, investment is completely irreversible ($I_t \geq 0$) as in Demers (1991) and Caggese (2007), among others. The investment friction embedded in the present model implies that once the capital good is produced, it can only be partially converted into a consumption good, considering that investment is largely an unrecoverable sunk cost. In practice, aggregate investment rarely approaches zero (Bloom, Bond, and Van Reenen 2007). Thus, constraint (11) with $\phi \gg 0$ arguably provides a better approximation of the macro-level investment lower bound without requiring firm heterogeneity or idiosyncratic shocks that are significantly larger than aggregate disturbances. In this way, partial irreversibility in our setup plays a key role in influencing macroeconomic dynamics in response to aggregate shocks and fiscal policy measures.

The firm's before-tax dividend in period t is:

$$D_t^b = Y_t - W_t N_t - I_t - \Phi\left(\frac{I_t}{K_{t-1}}\right), \tag{12}$$

with corporate income defined as $\pi_t = Y_t - W_t N_t$. Following Hayashi (1982), we introduce quadratic capital adjustment costs $\Phi\left(\frac{I_t}{K_{t-1}}\right) = \frac{\Psi}{2}\left(\frac{I_t}{K_{t-1}} - \delta\right)^2 K_{t-1}$ that are denominated in units of capital and deducted directly from the pre-corporate income tax dividend stream. The parameter $\Psi > 0$ governs the magnitude of the convex adjustment costs to capital accumulation. These symmetric adjustment costs are incurred regardless of whether the firm decides to invest or disinvest, unlike the nonconvex asymmetric costs associated with irreversible investment.[10]

Defining τ^π as the corporate income tax rate and τ^I as an investment tax-subsidy, both of which are kept constant, the after-corporate income tax dividend is:

$$D_t = (1 - \tau^\pi)(Y_t - W_t N_t) - \left(1 + \tau^I\right) I_t - \Phi\left(\frac{I_t}{K_{t-1}}\right). \tag{13}$$

From (13), and as in Santoro and Wei (2011), net investment and adjustment costs are expensed out of profits after profit taxes are levied. Denoting τ_t^D as the potentially time-varying dividend

[9] Steady-state variables are denoted without the time subscript.

[10] We also considered introducing fixed costs for investment or disinvestment, as in Chirinko and Schaller (2009) for example, but found that this type of adjustment cost did not materially affect our counterfactual tax policy results.

tax rate, the firm maximizes the present discounted value of the after-tax dividend payout $\bar{D}_t$:

$$\max_{N_t,K_t,I_t} E_0 \sum_{t=0}^{\infty} \beta^t \frac{\Lambda_t}{\Lambda_0} \left(1-\tau_t^D\right) \left[\left(1-\tau^\pi\right)\left(Y_t - W_t N_t\right) - \left(1+\tau^I\right) I_t - \Phi\left(\frac{I_t}{K_{t-1}}\right) \right],$$

subject to (8), (10), and (11). The term $\beta^t \left(\Lambda_t/\Lambda_0\right) \equiv M_{0,t}$ represents the firm's stochastic discount factor between period 0 and period t, with Λ_t given by (3).

Defining q_t as the shadow price of installed capital – Tobin's q (the Lagrange multiplier on (10)), and λ_t as the Lagrange multiplier on the irreversibility constraint (11), the firm's first-order conditions with respect to the choice of input factors (N_t, K_t) and investment (I_t) are:

$$(1-\alpha)\frac{Y_t}{N_t} = W_t, \tag{14}$$

$$q_t = \beta E_t \frac{\Lambda_{t+1}}{\Lambda_t} \left\{ \left(1-\tau_{t+1}^D\right) \left[\left(1-\tau^\pi\right) \alpha \frac{Y_{t+1}}{K_t} - \Phi_{K,t+1} \right] + q_{t+1}(1-\delta) \right\}, \tag{15}$$

$$q_t = \left(1-\tau_t^D\right) \left[\left(1+\tau^I\right) + \Phi_{I,t} \right] - \lambda_t. \tag{16}$$

The corresponding complementary-slackness condition is:

$$\lambda_t \left(I_t - \phi I\right) = 0; \quad \lambda_t \geq 0. \tag{17}$$

Equation (14) determines the optimal labor demand. Equation (16) demonstrates that Tobin's marginal q is inversely related to both the dividend tax rate τ_t^D and the shadow cost of the irreversibility constraint λ_t. When I_t reaches its lower bound, q_t decreases due to the binding irreversibility constraint, making investment less attractive. Alternatively, and as also implied from (16), the firm remains active up to the point where it is indifferent between investing in an additional unit of capital with effective price $\left(1+\tau^I+\Phi_{I,t}\right)^{-1}(q_t+\lambda_t)$, augmented for adjustment costs and the investment irreversibility shadow value, and paying out dividends to the household with value $\left(1-\tau_t^D\right)$. During an inactivity spell, a higher τ_t^D that reduces the market valuation of the firm must be met with either a lower λ_t, mitigating the cost of investment irreversibility, and/or a lower q_t, keeping the firm in the inaction region. The multiplier λ_t essentially drives a wedge between the dividend tax-adjusted market valuation of capital and the adjustment cost-augmented internal valuation of capital. Formally, the state-contingent irreversibility shadow value satisfies:

$$\lambda_t = \max\left\{ \left[\left(1+\tau^I\right) + \Psi\left(\frac{I_t}{K_{t-1}} - \delta\right) \right] \left(1-\tau_t^D\right) - q_t, 0 \right\}. \tag{18}$$

A firm will therefore undertake positive investment if $q_t\left[\left(1+\tau^I\right)+\Psi\left(\frac{I_t}{K_{t-1}}-\delta\right)\right]^{-1}\geq\left(1-\tau_t^D\right)$, and disinvest or remain inactive otherwise.

It is important to note that even in the presence of an investment irreversibility constraint, we can establish that the equality between marginal and average q persists by applying conditions (4), (8), (13), and (15). This celebrated equality holds when utilizing a CRS production function in combination with profit and convex adjustment cost functions that adhere to Hayashi's (1982) criteria of proportionality and homogeneity with respect to capital and investment. Moreover, because the investment irreversibility shadow value enters directly into the price of capital equation, it does not alter the equivalence between the marginal and average q.[11]

In line with Ghilardi and Zilberman (2024), the inclusion of $\tau^I \lesseqgtr 0$ can account for any additional wedges between the internal capital price q and its external value $\left(1-\tau^D\right)$, extending beyond the shadow value of the irreversibility constraint (see equations (16) and (18)). As explained in Brinca, Chari, Kehoe, and McGrattan (2016), τ^I can be interpreted as a proxy to average capital gains tax minus investment subsidies, which is how we calibrate this parameter later in the text. In addition, τ^I facilitates a better match between the frequency of the irreversibility constraint binding in the model and its U.S. data counterpart.[12] For the rest of this section, we opt for analytical simplicity by setting $\tau^I=0$. Nevertheless, we reintroduce τ^I in the model calibration section and when presenting the quantitative results.

Now, combine (15) and (16), use the specific formulation of the quadratic adjustment cost function $\Phi(\cdot)$, and define the stochastic discount factor from period t to $t+1$ as $M_{t,t+1}=\beta\left(\Lambda_{t+1}/\Lambda_t\right)=R_{t,t+1}^{-1}$ to retrieve the capital-investment Euler equation:

$$\begin{aligned}
&\left(1-\tau_t^D\right)\left[1+\Psi\left(\frac{I_t}{K_{t-1}}-\delta\right)-\frac{\lambda_t}{\left(1-\tau_t^D\right)}\right] \\
=\;& E_t M_{t,t+1}\left(1-\tau_{t+1}^D\right)\left\{\begin{array}{c}\left[\left(1-\tau^\pi\right)\alpha\frac{Y_{t+1}}{K_t}+\frac{\Psi}{2}\left(\left(\frac{I_{t+1}}{K_t}\right)^2-\delta^2\right)\right] \\ +\left(1-\delta\right)\left[1+\Psi\left(\frac{I_{t+1}}{K_t}-\delta\right)-\frac{\lambda_{t+1}}{\left(1-\tau_{t+1}^D\right)}\right]\end{array}\right\}. \qquad (19)
\end{aligned}$$

The left-hand side of equation (19) is the marginal cost of investment, while the right-hand side is the expected marginal benefit. With investment irreversibility, accumulating an extra unit of capital today increases tomorrow's capital commitments and reduces the expected marginal benefit

[11] See also Ghilardi and Zilberman (2024) who make a similar argument with respect to the shadow cost of investment credit limits. In both models, the average q_t and the equity price p_t are related through the condition $p_t=q_tK_t$ with $S_t=1$ for all t.

[12] Nonetheless, this policy parameter does not independently drive the dynamic results, nor does it alter the model's counterfactual policy implications.

of investment by $E_t M_{t,t+1}(1-\delta)\lambda_{t+1}$. This forward-looking user-cost effect, emphasized in Abel and Eberly (1996, 1999), acts to lower the capital stock (see also our dynamic user-cost-of-capital analysis below). At the same time, the inability to dispose excess capital when the constraint bites reduces the firm's current effective marginal cost by λ_t, potentially leading to a higher capital stock under irreversibility (Bertola and Caballero 1994; Abel and Eberly 1999). As highlighted in Abel and Eberly (1999), the current capital stock with irreversibility is constrained by past investment behavior. This is the hangover effect that leads the firm to invest in more capital than is desired compared to a world with full investment flexibility. The opposing user-cost and hangover forces feature directly in the capital-investment Euler equation and will help explain the general equilibrium implications of aggregate shocks and endogenous payout tax financing policies in Section 4.

Turning to the impact of exogenous business tax policies at this stage, notice first that even a flat dividend tax rate ($\tau_t^D = \tau_{t+1}^D = \tau^D$) produces asymmetric effects on the marginal cost and benefit of investment when the irreversibility constraint is occasionally-binding. This tax-induced distortionary outcome is in the tradition of the 'old' view of dividend taxation (e.g., Poterba and Summers 1983). Nevertheless, the 'new' view, wherein flat dividend taxes have no impact on marginal investment decisions (e.g., Santoro and Wei 2011), prevails when $\lambda_t = 0$ for all t. By contrast, a potential increase in τ^π would always distort investment by lowering the after-tax marginal product of capital, thereby prolonging investment inactivity spells.

To better understand the nontrivial effects of payout taxes and costly reversibility on investment, we resort to the user-cost-of-capital approach introduced originally by Jorgenson (1963). Define the user-cost-of-capital u_t as the after-corporate income tax marginal cash flow of an additional unit of capital corrected for the quadratic adjustment costs:

$$u_t = (1-\tau^\pi)\,\alpha\frac{Y_{t+1}}{K_t} + \frac{\Psi}{2}\left[\left(\frac{I_{t+1}}{K_t}\right)^2 - \delta^2\right]. \tag{20}$$

Considering the deterministic case for simplicity, substitute (20) in (19) to derive:

$$\begin{aligned} u_t \;=\; & M_{t,t+1}^{-1}\frac{(1-\tau_t^D)}{(1-\tau_{t+1}^D)}\left[1+\Psi\left(\frac{I_t}{K_{t-1}}-\delta\right)\right] - (1-\delta)\left[1+\Psi\left(\frac{I_{t+1}}{K_t}-\delta\right)\right] \\ & + \frac{1}{(1-\tau_{t+1}^D)}\left[(1-\delta)\lambda_{t+1} - M_{t,t+1}^{-1}\lambda_t\right]. \end{aligned} \tag{21}$$

Regardless of the irreversibility constraint, transitory shifts in dividend taxes first influence u_t and I_t through an intertemporal tax arbitrage effect (Korinek and Stiglitz 2009; Gourio and

Miao 2011; Ghilardi and Zilberman 2024). Specifically, a temporary increase in dividend taxes today relative to tomorrow, $\left(1-\tau_t^D\right)/\left(1-\tau_{t+1}^D\right)<1$ keeping $M_{t,t+1}^{-1}$ fixed, lowers the user-cost-of-capital and raises current investment. Intuitively, anticipating a future reversal of a tax hike implemented in period t causes the firm to reduce dividend payouts today, resulting in higher capital accumulation over time. Once variations in $M_{t,t+1}^{-1}$ are allowed for, a lower stochastic discount factor (a higher interest rate) raises the opportunity cost of capital and dampens the rise in investment triggered by the intertemporal dividend tax arbitrage channel. Overall, in the absence of investment irreversibility, temporary payout tax hikes can be either expansionary or contractionary, depending on how interest rate movements compare to expected tax alterations. Given its strong connection to the Jorgenson user-cost effect, we define the net impact of the tax arbitrage channel as the *interest rate-adjusted tax arbitrage channel.*

When the investment irreversibility constraint is occasionally-binding, the present and future shadow costs of the investment friction as a fraction of the firm's future stock market valuation, $M_{t,t+1}^{-1}\lambda_t/\left(1-\tau_{t+1}^D\right)$ and $\left(1-\delta\right)\lambda_{t+1}/\left(1-\tau_{t+1}^D\right)$, have direct and opposing effects on u_t through the hangover and user-cost channels described above. Following a large unfavorable shock that pushes I_t down to ϕI, excess capital cannot be sold, and as a result u_t *decreases* through the decline in $\left(1-\tau^\pi\right)\alpha Y_{t+1}/K_t$. Such hangover effect is compensated by an increase in λ_t on the right-hand side of equation (21). Here, a lower stochastic discount factor increases the tightness of the irreversibility constraint in period t by making the future less important. All else equal, an increased interest rate can foster current investment spending by mitigating the adverse effects associated with committing to a larger capital stock in the future (e.g., Faig and Shum 1999).

Furthermore, the possibility of a future binding constraint, $\lambda_{t+1}>0$, makes the firm more cautious about capital investment, thereby triggering an *increase* in u_t via the user-cost irreversibility channel. Due to the risks and additional costs associated with unfavorable future market conditions and disinvestment, the forward-looking firm preemptively restricts capital accumulation today to prevent future overcapacity. The depreciation rate attached to λ_{t+1} acts to relax the expected tightness of the investment friction in this case as it limits the need to engage in costly investment reversals. As in any investment model, depreciation also serves to raise the opportunity cost of capital and shrink investment as seen from the second term on the right-hand side of equation (21).

How do dividend taxes interact with λ_t and λ_{t+1}? The term

$$\left(1-\tau_{t+1}^D\right)^{-1}\left[\left(1-\delta\right)\lambda_{t+1}-M_{t,t+1}^{-1}\lambda_t\right]$$

in (21) reveals that shareholder taxes amplify the hangover and user-cost effects inflicted by the present and expected investment friction shadow costs on u_t and, consequently, on I_t. Intuitively, an elevated payout tax rate under investment inflexibility reduces the firm's stock market valuation and prompts the household-shareholder to demand a higher rate of return. As the opportunity cost of capital rises, the firm delays investment further which acts to raise u_t for given values of λ_t and λ_{t+1}. The net effect of the investment irreversibility cost as a fraction of the tax wedge $\left(1-\tau_{t+1}^D\right)$ is determined by variations in the stochastic interest rate $M_{t,t+1}^{-1}$ relative to the nondepreciated value of capital $(1-\delta)$. Due to the tight connection between payout taxes and the partial investment irreversibility constraint, both the hangover and user-cost effects associated with irreversibility are *tax-augmented.*

An additional mechanism influencing the user-cost equation is the *tax-augmented adjustment cost* effect associated with the term:

$$M_{t,t+1}^{-1}\frac{\left(1-\tau_t^D\right)}{\left(1-\tau_{t+1}^D\right)}\Psi\left(\frac{I_t}{K_{t-1}}-\delta\right)-(1-\delta)\left[1+\Psi\left(\frac{I_{t+1}}{K_t}-\delta\right)\right].$$

This channel captures how dividend taxes interact with symmetric capital adjustment frictions to influence investment decisions. The first component effectively represents the adjustment cost as a fraction of intertemporal tax changes. The second component captures the continuation value of existing capital, accounting for depreciation and future adjustment costs. Although not the primary driver of investment and debt ratio dynamics in our framework (see Figures 3 and 4 below), this overall adjustment cost mechanism highlights how payout tax policies can subtly impact investment through their interactions with convex capital adjustment costs.

To illustrate how the steady-state capital stock is affected by the cost of reversibility and corporation taxes, consider a scenario where the firm faces a permanently binding long-run equilibrium with $\lambda > 0$. By suppressing time subscripts and combining equations (8), (10), and (19), we obtain:

$$\frac{K}{N}=\left\{\frac{\alpha\left(1-\tau^\pi\right)}{\left[\beta^{-1}-(1-\delta)\right]\left[1-\lambda\left(1-\tau^D\right)^{-1}\right]}\right\}^{\frac{1}{1-\alpha}}, \tag{22}$$

where the denominator on the right-hand side of (22) is precisely the steady-state value of the user-cost-of-capital. In the absence of uncertainty and for $\beta^{-1}>1>(1-\delta)$, tighter irreversibility unambiguously leads to a higher K in the deterministic steady-state. Put differently, the hangover effect globally dominates the user-cost mechanism in the long-run, a result consistent with Bertola and Caballero (1994). The underlying logic here is that excess capacity diminishes gradually over time as it is affected by the depreciation attached to the future constraint's shadow value. As a result, the value from disinvestment decreases as time progresses.

Importantly, a permanent rise in τ^D raises the irreversibility cost-payout tax wedge ratio,

$\lambda / \left(1-\tau^D\right)$, thus tending to exacerbate the firm's inability to sell capital and strengthening the hangover effect in the long-run. However, in the simulations presented throughout Section 4, we will assume that the firm always starts from a slack steady-state equilibrium. Concretely, for $\lambda = 0$, K/N derived in (22) aligns with the neoclassical frictionless capital-to-labor ratio distorted by only τ^π, and with τ^D following the 'new' view of dividend taxation in the long-run. Indeed, the focus of our paper is to analyze the dynamic macroeconomic, asset pricing, and budgetary effects of time-varying fiscal policies in the presence of an occasionally-binding irreversibility constraint.

2.3 Government

The government decides on a set of taxes $(T_t, \tau_t^D, \tau^\pi, \tau^I)$, public debt (B_t), and government spending (G_t) to satisfy its flow budget constraint:[13]

$$\tau^\pi \left(Y_t - W_t N_t\right) + \tau_t^D D_t + \tau^I I_t + B_t + T_t = G_t + R_{t-1} B_{t-1}. \tag{23}$$

In the spirit of Leeper and Yang (2008) and Sims and Wolff (2018), we assume that public expenditures must result in one or more tax adjustments to ensure budget solvency. Compared to these papers, here the focus is on dividend taxes that respond to government indebtedness in a model with empirically-relevant investment frictions. Dividend taxes adjust according to the following simple contemporaneous feedback rule:

$$\tau_t^D = \tau^D + \psi_D \left(\frac{B_t}{Y_t} - \frac{B}{Y}\right), \tag{24}$$

where $\psi_D \geq 0$ measures the responsiveness of τ_t^D to cyclical deviations in the public debt-to-output ratio (B_t/Y_t) from its exogenous steady-state target (B/Y). Fiscal rules are chosen such that unsustainable public debt paths are ruled out, thus ensuring stationarity of the debt-to-GDP ratio and model stability (see also Croce, Kung, Nguyen, and Schmid 2012; Traum and Yang 2015).

As a benchmark case and a point of reference, we allow lump-sum taxes to adjust according to:

$$T_t = T + \psi_T \left(\frac{B_t}{Y_t} - \frac{B}{Y}\right), \tag{25}$$

where $\psi_T > 0$ is selected to guarantee model stability and to produce an empirically-relevant

[13] In equation (23), τ^I represents the net effect of capital gains taxation and investment subsidies. As such, it can take either positive or negative values, capturing cases where investment subsidies outweigh capital gains taxes or vice versa. The formulation in the government budget constraint reflects this net taxation structure without explicitly specifying whether it operates as a tax or a subsidy in equilibrium. In the calibration, we assign a value to τ^I to match some model moments without affecting the model's dynamic results.

estimate for the standard deviation of the logarithmic debt-to-GDP ratio when $\psi_D = 0$.[14] We assume agents have full knowledge of the targeted fiscal policy values.

Finally, government spending G_t follows the $AR(1)$ process:

$$\ln\left(\frac{G_t}{G}\right) = \rho_G \ln\left(\frac{G_{t-1}}{G}\right) + \varepsilon_{G,t}, \tag{26}$$

where $\rho_G \in (0,1)$ is the degree of persistence, and $\varepsilon_{G,t} \sim i.i.d.\mathcal{N}\left(0, \sigma_G^2\right)$. As the focus of this paper is mainly on the distortionary effects of dividend taxes in a model with public debt and partial investment irreversibility, we treat government spending as a purely exogenous process that serves as a business cycle trigger. By using G_t as a business cycle trigger, we aim to partly explain the persistent rise in debt ratios over recent decades and the anticipated increases ahead (see also Croce, Kung, Nguyen, and Schmid 2012; Le Grand and Ragot 2025).[15]

2.4 Competitive Equilibrium

Without loss of generality, we normalize $S_t = 1$ for all t, with the firm having no access to issuing new stocks. With an occasionally-binding investment irreversibility constraint represented by (17), a competitive rational expectations equilibrium is then defined as the household's decisions $\{C_t, N_t, B_t\}_{t=0}^{\infty}$, the firm's decisions $\{K_t, N_t, I_t\}_{t=0}^{\infty}$, prices $\{p_t, q_t, R_t, W_t\}_{t=0}^{\infty}$, technology $\{A_t\}_{t=0}^{\infty}$, and policy variables $\left\{\tau_t^D, B_t, G_t, T_t\right\}_{t=0}^{\infty}$, such that given the initial levels of capital and public debt, K_{-1} and B_{-1}, the optimality conditions for the household and firm (conditions (3)-(6) and (14)-(17)) hold in each period; the capital, labor, bond, equity, and goods markets clear with

$$Y_t = C_t + I_t + G_t + \frac{\Psi}{2}\left(\frac{I_t}{K_{t-1}} - \delta\right)^2 K_{t-1}; \tag{27}$$

the transversality conditions are met; and the government's budget constraint and policy functions (23)-(26) are satisfied.

[14] Leeper, Plante, and Traum (2010) have shown that different fiscal rules matter for quantitative policy analysis. However, for our purposes, we concentrate on the simple tax rules (24) and (25) which offer valuable insights into the impact of distortionary dividend tax financing policies. Drautzburg and Uhlig (2015) and Fotiou, Shen, and Yang (2020) adopt a comparable approach. At the same time, their models abstract from investment irreversibility, and focus instead on personal labor and capital income tax financing.

[15] As in standard RBC models, government spending is viewed as a "waste" and a source of business cycle and debt fluctuations. Extending the model to allow G_t to improve welfare or productivity is beyond the scope of this paper, though it presents an avenue for future research. Here, we do not aim to study whether an increase in government spending is beneficial or harmful to society, and we remain agnostic on this normative matter.

3 Calibration and Estimation

The model is calibrated for some parameters and estimated for others, with each period corresponding to a year. Table 1 reports the structural parameter and steady-state fiscal policy values that approximately replicate some average macroeconomic ratios and key data characteristics in the U.S. nonfinancial corporate sector.[16]

Table 1: Baseline Calibration

Parameter	Value	Description
β	0.94	Discount Factor
γ	2	Relative Risk Aversion
h	13	Disutility Weight on Labor
δ	0.08	Capital Depreciation Rate
α	0.32	Capital Share in Production
ϕ	0.967	Threshold for Investment Constraint
Ψ	0.54	Capital Adjustment Cost Parameter
τ^{π}	0.32	Corporate Income Tax Rate
τ^{D}	0.12	Dividend Tax Rate
τ^{I}	-0.07	Investment Subsidy Rate
g	0.19	Government Spending-to-GDP Ratio
B/Y	0.70	Public Debt-to-GDP Ratio
T/Y	0.13	Lump-sum Tax-to-GDP Ratio
ψ_T	0.042	Lump-sum Tax Adjustment to the Debt-to-GDP Ratio
ψ_D	0.2; 0.4	Dividend Tax Adjustment to the Debt-to-GDP Ratio

Most structural parameter choices are standard. The constant relative risk aversion (CRRA) coefficient is $\gamma = 2$, a common value used in the RBC literature. The weight attached to the disutility from labor is $h = 13$, which pins down the steady-state level of labor to $N = 0.3$ (Gourio and Miao 2011). We select $\beta = 0.94$ so that the annualized long-run risk-adjusted rate of return on equity is around 6.4% . The depreciation rate is set to $\delta = 0.08$ in order to match the long-run annualized mean nonfinancial corporate investment rate (I/K); the share of capital in production is $\alpha = 0.32$; and the capital adjustment cost parameter is $\Psi = 0.54$ (Ghilardi and Zilberman 2024).

[16] Data statistics are drawn from Federal Reserve Economic Database (FRED) of the Federal Reserve Bank of St. Louis.

We set $\tau^I = -0.07$ as a net subsidy which approximately reflects the difference between the long-run effective capital gains tax of 19% minus the average business subsidy of 26% across various nonresidential industries (see, e.g., House, Mocanu, and Shapiro 2017).

Next, we discipline the fiscal parameters using U.S. data from 2010-2019. This allows us to provide more meaningful counterfactual results, considering the high public debt environment that has prevailed since the Great Recession. We choose $\tau^D = 0.12$ and $\tau^\pi = 0.32$ based on McGrattan's (2023) average effective marginal tax calculations for this sample period. Together with an average 19% government expenditure share of GDP ($g \equiv G/Y = 0.19$), our calibration yields a corporate investment-to-output ratio of 0.13, an after-tax net dividend-to-output ratio of 0.085, a capital-to-GDP ratio of 1.63, and an equity price-to-GDP ratio of 1.33. These ratios are comparable with their U.S. data counterparts over the specified timeframe (see also McGrattan 2023).

Furthermore, we select a benchmark public debt ratio of $B/Y = 0.7$, roughly corresponding to the average ratio of federal debt held by the public to GDP between 2010 and 2019, while assuming that lump-sum taxes adjust in the steady-state in order to maintain a long-run zero-deficit policy.[17] Using our parameterization so far, the lump-sum tax-to-GDP ratio must be set to $T/Y = 0.13$ for the steady-state version of condition (23) to hold with equality. Importantly, equation (23) is an additional constraint when examining the transitional model dynamics given that corporation tax revenues cannot be rebated to households as transfers. Enabling lump-sum taxes to adapt in steady-state ensures long-run fiscal solvency without having to compromise on the empirically-relevant average values chosen for τ^π, τ^I, τ^D, g, and/or B/Y.[18]

Turning to the estimation procedure, we employ standard Bayesian techniques to estimate the persistence parameters and standard deviations of the $AR(1)$ productivity and government spending shocks $[\rho_A, \sigma_A; \rho_G, \sigma_G]$ in the linear RBC model. We do so by solving for the innovations that minimize the distance between the data and the model's predictions in each period. The

[17] We have also explored the macroeconomic consequences of time-varying fiscal policies in scenarios with different initial public debt-to-output ratios. Specifically, we have considered a 95% ratio, representative of the average observed from 2019 to 2024, and a 40% ratio, reflecting the average from 1970 until the onset of the COVID-19 pandemic. Our findings indicate that the impulse response functions of real private-sector variables and asset prices remain qualitatively very similar across B/Y ratios of 0.4, 0.7, and 0.95, regardless of the investment irreversibility constraint. In fact, Aloui and Eyquem (2019) show that the dynamics of private-sector variables following discretionary government spending shocks, which are not contingent on the state of the economy, are only minimally impacted by the economy's initial steady-state debt position. However, the volatility of $\ln(B_t/Y_t)$ is considerably larger (smaller) when the economy starts from a lower (higher) steady-state debt ratio. Consistent with Ilzetzki, Mendoza, and Végh (2013), among others, we also find that cumulative output (investment) multipliers following an increase in G_t become quantitatively smaller (more negative) when the economy starts from a worse debt position. At the same time, none of our counterfactual policy implications examined below are affected by changes in the steady-state debt ratio. A sensitivity analysis that complements the multiplier calculations in Table 3, presented later in the text, is available upon request.

[18] Our findings remain robust even if steady-state lump-sum taxes are not permitted, and we make adjustments to one of the other five aforementioned fiscal policy long-run targets.

observed simulated data for the two targeted variables – $\ln(I_t)$ and $\ln(G_t)$ – correspond to U.S. linear detrended real nonfinancial corporate investment, and real government consumption and gross investment expenditures. The data spans from 1970 until 2019, just prior to the onset of the COVID-19 recession and the massive fiscal stimulus acts that followed. For the model estimation and to ensure a model solution, we allow for only lump-sum taxes to respond to deviations in the debt ratio with $\psi_T = 0.042$ while setting $\psi_D = 0$. The value chosen for ψ_T also guarantees an approximate match between the standard deviation of the logarithmic debt-to-GDP ratio in the model and the data (see Table 4 below).

Table 2 displays the postulated priors (shape of distribution, mean, and standard deviation) as well as the estimation results (posterior mean and standard deviation) derived from the linear model. The parameters related to the prior distributions of the estimation are standard in the literature. Broadly speaking, despite the stylized model with only two shocks, the posterior mean values fall between the estimates reported in Traum and Yang (2015) and Sims and Wolff (2018), after adjusting for annual terms.[19]

Table 2: Estimation Results

Parameter	Prior Shape	Prior Mean	Prior Std	Post. Mean	Post. Std
ρ_A	Beta	0.6	0.1	0.62	0.073
ρ_G	Beta	0.6	0.1	0.78	0.051
σ_A	InvGam	0.005	0.01	0.011	0.001
σ_G	InvGam	0.005	0.01	0.015	0.002

Note: ‘Std’ - Standard Deviation; ‘Post’ - Posterior; InvGam - Inverse Gamma.

Once the posterior means from the linear RBC model are established, we set the degree of irreversibility to $\phi = 0.967$, such that in the benchmark lump-sum tax adjustment scenario, the irreversibility constraint binds 39.4% of the time following a combination of the estimated technology and government expenditure shocks. The frequency of the constraint binding in our model matches its empirical counterpart when we apply the 1970-2019 time-series data values for τ_t^D and q_t, along with our estimate for τ^I, to equation (18) – see also Guerrieri and Iacoviello (2015) who target a slightly lower probability of 38%. Given the evidence supporting a time-varying wedge between the external and internal prices of capital, as shown by Chirinko and Schaller (2009) and captured by the estimated irreversibility shadow value λ_t in our setting, we find the ‘irreversible investment’ economy to be a more suitable laboratory for our main counterfactual tax policy analy-

[19] The moments of the government spending shocks derived from the Bayesian estimation are also consistent with those obtained by directly analyzing the linearly detrended time-series annual data (1970 to 2019) on ‘real government consumption and gross investment expenditures’ from FRED.

sis. For comparison, we also present the investment CIRs and second moments of key variables in a frictionless RBC framework, as shown in Figure 2 and Table 4 later in the text.

When the dividend tax rule becomes operative, we first pick $\psi_D = 0.2$ and then $\psi_D = 0.4$ to analyze the effects of a stronger response of the tax rule to given deviations in the debt ratio. Moreover, similar to Croce, Kung, Nguyen, and Schmid (2012), the values for ψ_D are conservatively chosen to ensure that the estimated annual volatility of the payout tax rate does not exceed half of the observed standard deviations of this tax under any policy regime or model specification examined in the next section.

To perform the subsequent analysis, we take the calibration values and posterior means from Tables 1 and 2, while allowing for the irreversibility constraint to occasionally-bind with $\phi = 0.967$. The occasionally-binding model is solved using the piecewise-linear OccBin algorithm developed by Guerrieri and Iacoviello (2015) and the DynareOBC algorithm developed by Holden (2016), both of which produce the same results.

4 Main Results

This section examines the dynamic macroeconomic, asset price, and budgetary impacts of counterfactual deficit-financing shareholder tax policies while emphasizing the role of irreversibility in shaping model dynamics. We analyze impulse response functions (IRFs) and investment cumulative impulse responses (CIRs) following a positive government spending shock, which triggers an increase in debt and taxes.[20] Net cumulative present-value government spending multipliers are then computed under the investment irreversibility framework and compared to those in a benchmark RBC model across different tax rules. Finally, we examine key second moments of the model, calculate the frequency with which the constraint binds under different tax regimes, and assess how well these align with the data. We also perform a variance-covariance decomposition to show how the main channels in the user-cost equation (21) contribute to asymptotic investment and debt ratio volatilities in the stochastic models, both with and without irreversibility.

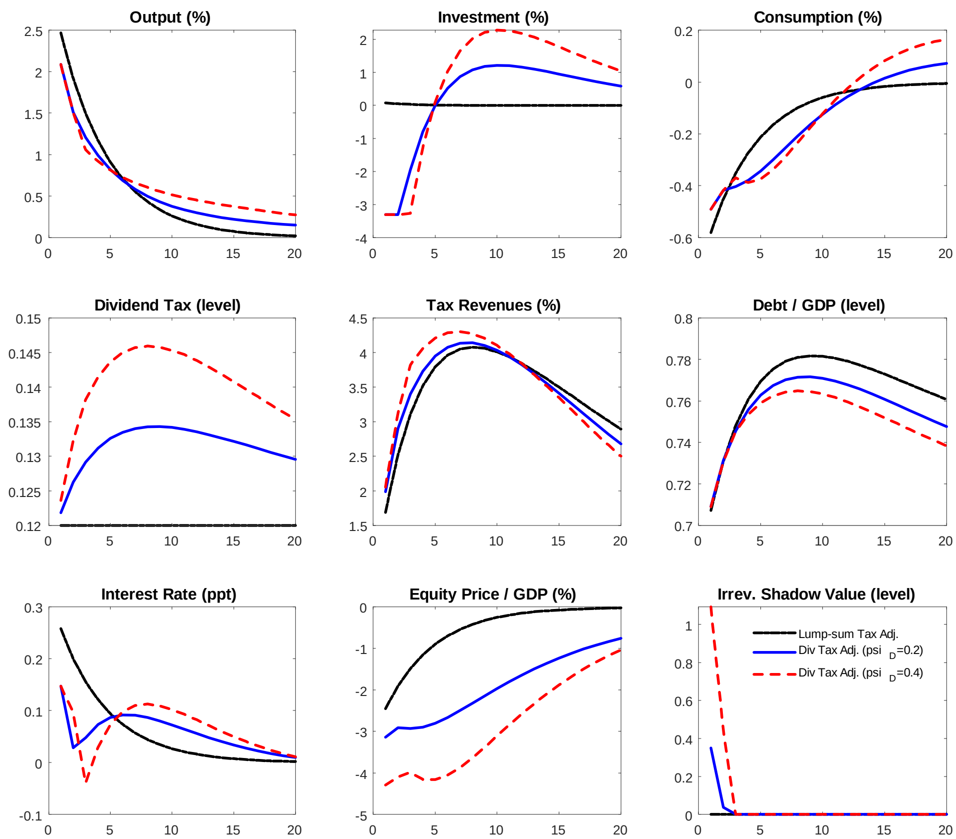
4.1 Dynamic Effects of Fiscal Policies

Impulse Response Functions. — Figure 1 presents the IRFs of key model variables following a large temporary 15% increase in government spending. We plot three policy scenarios: *i)* lump-sum tax adjustment only ($\psi_T = 0.042$ and $\psi_D = 0$); *ii)* moderate dividend tax response ($\psi_T = 0.042$ and

[20] The Appendix presents the impulse responses and interactions of dividend taxation and investment irreversibility following an adverse technology shock.

$\psi_D = 0.2$); and *iii)* large payout tax response ($\psi_T = 0.042$ and $\psi_D = 0.4$).[21] In the simulations, we allow the irreversibility constraint to occasionally bind with deviations measured with respect to the frictionless steady-state equilibrium ($\lambda = 0$).

Figure 1: Positive Government Spending Shock under Alternative Financing Schemes



Starting with the benchmark case where only nondistortionary lump-sum taxes adjust to ensure long-run debt solvency, a temporary expansionary government spending shock initially boosts output but crowds out private consumption. To alleviate the decline in consumption linked to the negative wealth effect, labor supply increases, which, in turn, produces the aforementioned positive impact on GDP (see, e.g., Ramey 2019).

Moreover, reduced resources available for private expenditures result in a higher interest rate and a lower equity price-to-GDP ratio, aligning with empirical evidence presented by Ardagna (2009). At the same time, investment shows little movement, as it is influenced by two opposing

[21] Note that we maintain $\psi_T = 0.042$ even when dividend taxes are allowed to adjust. This approach allows for a clearer analysis, emphasizing the differences between tax regimes relative to the lump-sum tax adjustment benchmark.

forces. On one hand, investment declines due to the typical crowding-out effect led by an increase in G_t. On the other hand, the relatively persistent government spending shock and the resulting rise in the marginal product of capital – driven by the increase in labor – cause investment to rise. Given our calibration and the estimated shock, the net effect on investment is close to zero, with $\ln(I_t)$ rising by a mere 0.07% upon impact.[22] As investment remains slightly above its steady-state, the investment constraint multiplier λ_t stays at zero when only lump-sum taxes respond (mildly) to elevated public debt levels. With T_t reacting modestly to changes in the debt ratio, the latter gradually increases, peaking at approximately 78% by year 9. Correspondingly, tax revenues rise only slightly when the government relies solely on debt-reducing lump-sum taxes.

Turning now to the effects of deficit-financing dividend taxes with $\psi_D = 0.2$ and $\psi_T = 0.042$, a rise in τ_t^D results in an initial fall in investment and triggers a temporarily binding irreversibility constraint as investment enters the inactivity region. Specifically, investment drops by 3.3% and remains at its lower bound for 2 periods. Furthermore, because investment falls upon impact, the initial effect on consumption is mitigated by intertemporal substitution. Simultaneously, the equity-to-output ratio declines by 3.15% at the onset of the shock, followed by a slow return to its steady-state level. In the medium-run, investment starts increasing and remains persistently above its steady-state after period 5.

To explain these nontrivial lumpy dynamics, recall from Section 2.2 that payout taxes affect investment through three main conflicting channels: *i)* an interest rate-adjusted intertemporal tax arbitrage channel captured by the term $M_{t,t+1}^{-1}\left(1-\tau_t^D\right)/\left(1-\tau_{t+1}^D\right)$ in the user-cost-of-capital equation (21); *ii)* the tax-augmented hangover channel; and *iii)* the tax-adjusted user-cost channel. The latter two mechanisms are directly related to the interaction between shareholder taxation and the irreversibility friction tightness, specifically through the term $\left(1-\tau_{t+1}^D\right)^{-1}\left[(1-\delta)\,\lambda_{t+1} - M_{t,t+1}^{-1}\lambda_t\right]$ also present in equation (21).

The simulations reveal that the tax-augmented user-cost channel, $\left(1-\tau_{t+1}^D\right)^{-1}(1-\delta)\,\lambda_{t+1}$, dominates in the short-run, leading to the aforementioned decline in investment and a period of inactivity, along with an amplified drop in equity prices compared to the lump-sum tax-only scenario. Intuitively, the possibility of capital losses in the irreversible investment economy leads households to demand a higher rate of return, a response further exacerbated by the expected rise in the dividend tax rate. Consequently, interest rates increase, thereby raising the user-cost-of-capital and driving investment into the inactivity zone.

The intertemporal arbitrage channel, on its own, encourages investment by inducing reinvestment rather than dividend distributions when future tax rates are expected to be higher. However,

[22] See also Traum and Yang (2015) for the conditions under which investment is crowded out or in following positive government spending shocks.

its interaction with the interest rate-adjusted arbitrage channel $M_{t,t+1}^{-1}\left(1-\tau_t^D\right)/\left(1-\tau_{t+1}^D\right)$ alters this effect. A higher interest rate scales down the arbitrage effect in the user-cost equation, weakening its ability to stimulate investment. In the short-run, the initial interest rate spike overturns the investment-stimulating effect of the intertemporal arbitrage channel. The firm remains inactive, and equity prices decline further. The subsequent fall in interest rates revives the intertemporal arbitrage effect and fuels an investment rebound. As expectations of a future tax decline solidify, the interest rate gradually decreases, easing financing constraints and supporting the investment recovery.

In the medium-run, the tax-adjusted hangover and intertemporal tax arbitrage channels drive an investment surge. More formally, considering the tax-adjusted hangover channel $M_{t,t+1}^{-1}\lambda_t\left(1-\tau_{t+1}^D\right)^{-1}$ and the definition $R_{t,t+1}=M_{t,t+1}^{-1}$, the moderate rise in the interest rate during the recovery phase (from period 2 to 8) encourages additional investment by reducing the need to commit to a larger capital stock in the future (e.g., Faig and Shum 1999). As agents anticipate a decline in τ^D once accumulated debt is partially contained, the expected tax-adjusted cost of irreversibility drops sharply following its initial spike stemming from the tax-adjusted user-cost channel.

Overall, the adverse macroeconomic repercussions of the user-cost irreversibility channel, amplified by the rise in dividend taxes, are short-lived. Eventually, dividend tax financing measures lead to favorable investment and output outcomes over the longer horizon compared to the lump-sum tax adjustment case. Interestingly, with a stronger response to debt in the payout tax rule ($\psi_D=0.4$), the initial period of investment inactivity extends to 3 periods, followed by a more sizeable investment surge in the medium- to longer-run relative to the case where $\psi_D=0.2$. It is worth noting that τ_t^D exhibits a hump-shaped response, increasing from an initial 12% to a peak of 13.4% in period 8 when $\psi_D=0.2$, and from 12% to a peak of 14.5% in period 8 when $\psi_D=0.4$. Thus, even relatively small yet persistent changes in τ_t^D can produce enduring distortionary effects on real variables and asset prices.

Regarding government deficit financing and public debt, dividend tax hikes generate slightly higher tax revenues and result in a smaller increase in the debt-to-GDP ratio compared to a lump-sum tax adjustment scenario. Despite these favorable fiscal outcomes, it is important to emphasize that investment expenses are exempt from shareholder taxes, leading to a more moderate rise in the tax base, especially compared to a scenario where corporate income taxes would adjust by the same magnitude.[23] Another key factor contributing to the attenuated increase in fiscal revenues is the sharp decline in equity prices and distributions following the dividend tax hike. In other

[23] Simulations of equivalent corporate income tax changes are available upon request. Specifically, we have found that debt-driven increases in τ^π intensify short-run investment irreversibility while easing debt dynamics. Put differently, while a higher profit tax rate accelerates deficit reduction and raises fiscal revenues, it comes at the cost of more severe short-term investment distortions compared to equivalent adjustments in τ^D.

words, a stronger response to the debt ratio in the contemporaneous payout tax rule amplifies the decline in equity prices, while only moderately affecting the relative changes in public debt and tax revenues. Moreover, lower output levels over the longer-term keep the debt ratio persistently high across all fiscal policy scenarios, despite adjustments in dividend taxes. Thus, the shareholder tax remains elevated, contributing to the macroeconomic and asset pricing distortions highlighted above.

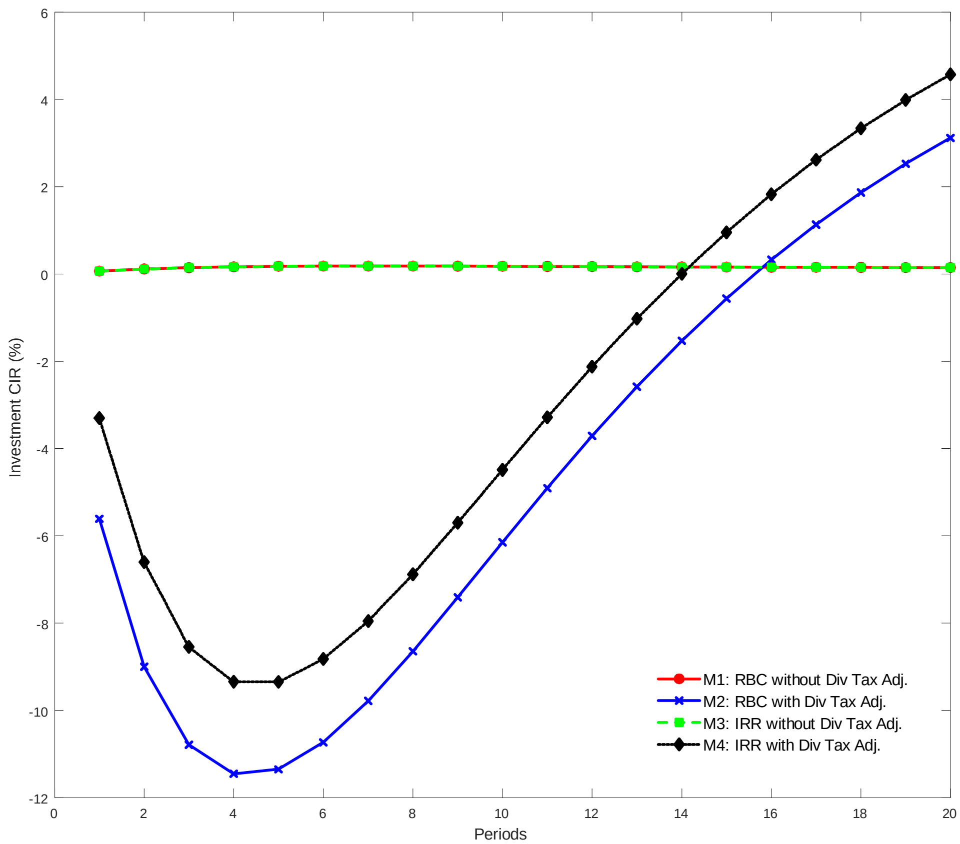
Cumulative Impulse Responses. — To capture the total effect of the 15% government spending shock over time, we adopt a similar approach to Baley and Blanco (2021, 2025) by calculating the investment CIRs. In our model, the CIR measures the cumulative sum of IRFs to the shock from period 0 (when the shock occurs) up to a certain period t. This method allows us to summarize the persistence of the investment response across different time horizons, emphasizing the roles of irreversibility and dividend tax adjustments in reaction to rising debt ratios. Specifically, we compare four different model scenarios: *M1)* a standard RBC model without dividend tax adjustments; *M2)* a standard RBC model with dividend tax adjustments; *M3)* an investment irreversibility (IRR) model without dividend tax adjustments; and *M4)* an IRR model with dividend tax adjustments. In all model specifications, we maintain the lump-sum tax adjustment rule with $\psi_T = 0.042$, while setting $\psi_D = 0.2$ in the models where payout taxes are permitted to adjust (i.e., M2 and M4).[24] Figure 2 plots the log investment CIRs under the four aforementioned policy regimes.

Consistent with our IRF analysis, investment CIRs are identical in models M1 and M3. In the absence of τ^D adjustments, the irreversibility constraint remains slack after the positive government spending shock, making CIRs in the IRR model indistinguishable from those in the frictionless RBC model. More interestingly, models M2 and M4, which include dividend tax rules, show rising CIRs over time, primarily driven by the intertemporal dividend tax arbitrage channel. However, the CIR reaches 4.57% in the tax-augmented IRR model (M4) after 20 periods, compared to 3.12% in the tax-adjusted RBC model (M2).[25] Thus, the interaction between dividend tax rules and the irreversibility constraint results in more persistent investment fluctuations, with the irreversibility friction driving the additional rise in CIRs over the longer-term. From a policy perspective, once debt is partially accommodated in the medium-term following the shareholder tax adjustment (observe Figure 1), the reduced dividend tax further amplifies the economic recovery, particularly when firms face costly downward adjustments to investment. In the Appendix, we show that these qualitative outcomes also hold following adverse technology shocks.

[24] The results presented below are amplified with a stronger payout tax response to the debt ratio ($\psi_D = 0.4$). These CIR simulations are available upon request.

[25] Note that we can obtain single CIR value at each date t, but in our simulations, we focus on $t = 20$ as a representation of the long-run CIR measure.

Figure 2: Investment CIRs under Different Model Specifications: Government Spending Shock



Government Spending Multipliers. — To summarize the quantitative effects of public expenditure shocks with various endogenous tax policy modifications, we adopt the approach of Drautzburg and Uhlig (2015) to calculate the net cumulative present-value multipliers (CPVM) across the three fiscal policy scenarios analyzed in the IRFs section. Specifically, we compute the net present value of output and investment changes up to a certain period t, divided by the corresponding change in government spending over the same period. The time-t multiplier is defined as:

$$CPVM_t = \frac{E_t \sum_{s=1}^{t} \left(\prod_{j=1}^{s} R_j^{-1} \right) (X_s - X)}{E_t \sum_{s=1}^{t} \left(\prod_{j=1}^{s} R_j^{-1} \right) (G_s - G)},$$

with $(X_s - X)$ standing for the differences in levels of Y, I and/or B from their respective steady-states, and $(G_s - G)$ denoting the level difference in government spending from its long-run value.

The discount factor is represented by the inverse of the interest rate, which, in turn, is determined by share prices and after-tax dividends through equation (7). The multiplier indicates the dollar changes in the variables of interest associated with a temporary $1 increase in government purchases.

Table 3: Cumulative Fiscal Spending Multipliers with and without Investment Irreversibility

	IRR Model			**Standard RBC Model**		
Output	1y	5y	10y	1y	5y	10y
Lump-sum Tax Adj.	0.865	0.865	0.865	0.865	0.865	0.865
Div. Tax Adj. (ψ_D= 0.2)	0.860	0.859	0.880	0.641	0.681	0.724
Div. Tax Adj. (ψ_D= 0.4)	0.860	0.859	0.911	0.491	0.568	0.651
Investment						
Lump-sum Tax Adj.	0.003	0.0026	0.0022	0.003	0.0026	0.0022
Div. Tax Adj. (ψ_D= 0.2)	-0.0016	-0.0024	0.019	-0.256	-0.167	-0.101
Div. Tax Adj. (ψ_D= 0.4)	-0.0016	-0.0024	0.051	-0.429	-0.263	-0.144
Debt						
Lump-sum Tax Adj.	0.861	2.592	4.560	0.861	2.592	4.560
Div. Tax Adj. (ψ_D= 0.2)	0.856	2.523	4.323	0.822	2.515	4.248
Div. Tax Adj. (ψ_D= 0.4)	0.851	2.466	4.089	0.792	2.424	3.962

Notes:

i) In the lump-sum tax only case (benchmark scenario) with ψ_T= 0.042, we set ψ_D= 0.

ii) When the payout tax rule adjusts, we keep ψ_T= 0.042.

iii) Payout tax rule adjustment coefficients are set to ψ_D= 0.2 or ψ_D= 0.4.

iv) 'y' - year(s).

Table 3 reports the corresponding multipliers with and without investment irreversibility under various tax financing schemes after 1, 5, and 10 years. As seen in Table 3, the interplay between irreversibility and distortionary financing through dividend taxes results in an output multiplier of 0.88 after 10 years when $\psi_D = 0.2$. This outcome is driven by increasing investment multipliers throughout the fiscal spending adjustment process in the medium- to long-run. In particular, the cumulative present value multiplier for investment reaches 0.019 in the longer-run (10 years), indicating the *dominance* of the tax-augmented hangover channel as time progresses. The strength of this mechanism is further supported by comparing the investment multipliers in the IRR model and the standard RBC model following payout tax adjustments. In both frameworks, the investment multiplier rises over the longer horizon due the interest rate-adjusted intertemporal tax arbitrage mechanism. However, after 10 periods, the investment multiplier is positive (0.019) when the firm faces costly reversibility, yet remains negative (-0.101) in the frictionless model. The positive investment multiplier in the longer-run is even higher when $\psi_D = 0.4$, specifically 0.051, supporting the policy implications derived from the IRFs analysis above. In other words, the tax-adjusted hangover channel alters the dynamics of longer-run investment following temporary government spending shocks. Over the shorter horizon, the tax-augmented user-cost channel dominates, linked to the negative (albeit small) investment multipliers.

Another key related observation is that when dividend taxes adjust, output remains relatively higher in the IRR model than in the RBC case, as irreversibility prevents the firm from sharply reducing its capital stock. Notably, the crowding-out effect on investment is significantly smaller across all dividend tax adjustment scenarios when the investment friction is occasionally-binding.

Table 3 also shows that the 'debt multiplier' – defined in our model as the ratio of the discounted cumulative response of debt to the discounted cumulative response of government spending – rises over time in both models, reflecting persistent debt accumulation following a government spending shock. When shareholder tax rules are active, the medium-run increase in the interest rate (see Figure 1) weakens the discounting effect and makes past debt accumulation more persistent in present-value terms. As a result, the cumulative debt response grows relative to the cumulative government spending response, pushing the debt multiplier higher. This effect is stronger in the IRR model, where investment irreversibility slows dividend payout adjustments and therefore delays fiscal consolidation. In contrast, under lump-sum taxation, output, investment, and the debt multiplier follow an identical path in both models since investment never reaches its lower bound (see also IRFs and CIRs above).[26]

Although payout tax adjustments reduce debt, the effect is modest, which helps explain the continued rise in the debt multiplier. As shown above, the investment multiplier increases in the longer-term. This recovery gradually stabilizes the debt ratio, as rising investment supports output growth and, in turn, fiscal revenues. However, because investment takes time to recover, debt initially accumulates and contributes to the rising debt multiplier.

Finally, in the RBC model, dividend tax adjustments lead to faster debt relief since the firm can fully adjust both investment and dividend payouts that generates an earlier boost in tax revenues. In contrast, in the IRR model, investment irreversibility limits the firm's ability to cut investment, which alters its response to dividend taxes and slows debt stabilization.

[26] The cumulative output multipliers under lump-sum tax adjustments for both model specifications lie within the ranges found in the empirical and theoretical literature, specifically when excluding the zero lower bound on nominal interest rates (see Ilzetzki, Mendoza, and Végh 2013; Ramey 2019 for a review).

These results highlight a trade-off: while stronger payout tax rules help contain debt, their impact remains limited and introduce significant macroeconomic frictions. In the IRR model, constrained investment responses and gradual dividend adjustments slow fiscal consolidation and reinforce debt accumulation. More broadly, the findings underscore the interplay between dividend taxation, investment frictions, macroeconomic dynamics, and debt management. Since payout tax changes create distinct distortions and budgetary effects, policymakers must balance such tax policies with investment incentives to minimize private market disruptions while ensuring fiscal sustainability.

4.2 Moments Analysis and Variance-Covariance Decomposition

Table 4 presents the standard deviations of key variables in both the U.S. data and our model, distinguishing between model-implied volatilities under different tax rules and whether the irreversibility constraint occasionally binds.

Table 4: A Comparison of Key Moments under Different Tax Regimes

	$\sigma\left(\ln\frac{I_t}{Y_t}\right)$	$\sigma\left(\ln\frac{p_t}{Y_t}\right)$	$\sigma\left(\ln\frac{B_t}{Y_t}\right)$	Frequency of Constraint Binding
U.S. Data (1970-2019)	5.198	13.792	7.698	39.5%
IRR Model				
Lump-sum Tax Adj.	4.253	1.196	7.609	39.4%
Div. Tax Adj. (ψ_D= 0.2)	4.162	1.882	6.028	37.2%
Div. Tax Adj. (ψ_D= 0.4)	4.094	2.405	5.063	35.3%
RBC Model				
Lump-sum Tax Adj.	6.024	1.438	7.242	0%
Div. Tax Adj. (ψ_D= 0.2)	5.763	2.014	5.753	0%
Div. Tax Adj. (ψ_D= 0.4)	5.578	2.488	4.842	0%

Notes:

i) Standard deviations $\sigma\left(\cdot\right)\%$ are computed from 1,000 simulations keeping A_t and G_t stochastic.

ii) In the lump-sum tax only case (benchmark scenario) with ψ_T= 0.042, we set ψ_D= 0.

iii) When the payout tax rule adjusts, we keep ψ_T= 0.042.

iv) Payout tax rule adjustment coefficients are set to ψ_D= 0.2 or ψ_D= 0.4.

A few results arise from Table 4. First, under all policy scenarios, the irreversibility constraint in the piecewise-linear IRR model reduces the logarithmic investment-to-GDP standard deviation relative to a fully-linear RBC setup (see, e.g., Dow and Olson 1992). This finding is also consistent with the quantitative analysis by Guerrieri and Iacoviello (2015), which shows that cyclical investment volatility is smaller when the irreversibility constraint is occasionally-binding. Notice also that the observed standard deviations of $\ln(I_t/Y_t)$ ratio lie between the corresponding values in the IRR and standard RBC models.

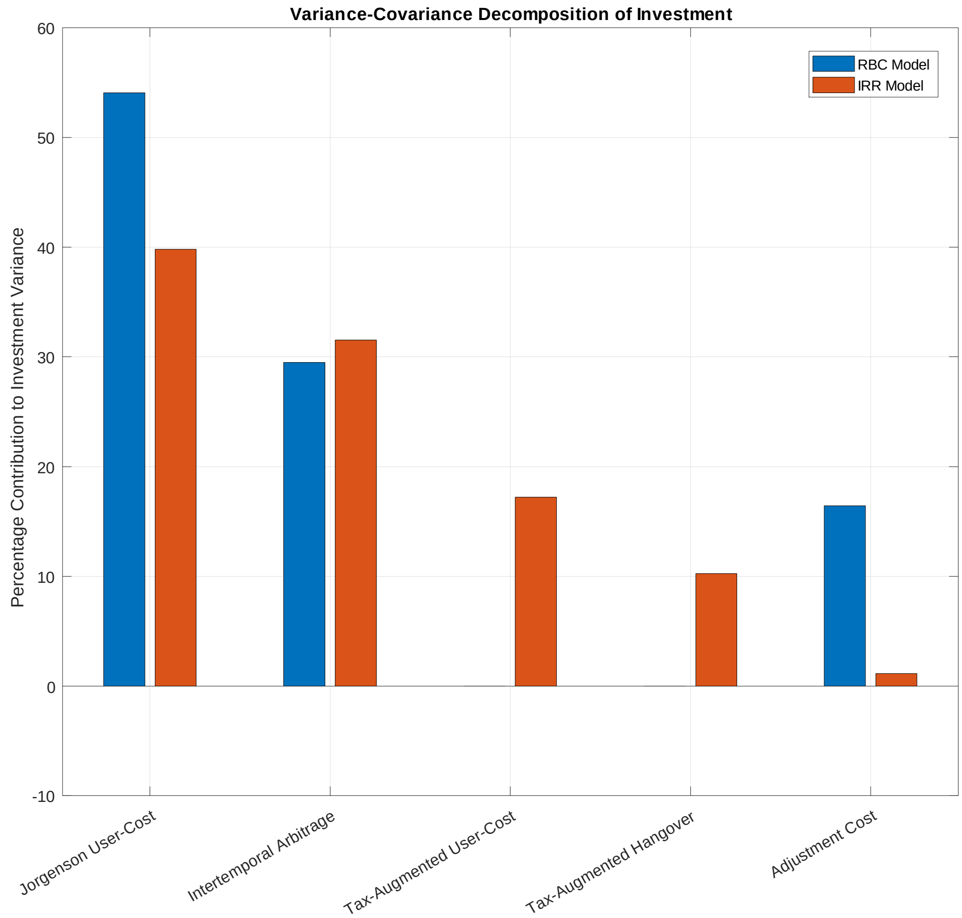
Second, in both the standard RBC and IRR models, variations in τ_t^D lead to mitigated fluctuations in the cyclical investment-to-GDP ratio compared the lump-sum tax adjustment scenario. This sharply contrasts with the effects of varying corporate income taxes, which exacerbate the volatility of investment, as shown by Croce, Kung, Nguyen, and Schmid (2012) for example. At the same time, stronger dividend tax adjustments also result in a significantly higher volatility in the logarithmic asset price-to-GDP ratio, and only a moderate relative decline in the volatility of the cyclical debt ratio.[27] Specifically, in the IRR model, moving from $\psi_D = 0.2$ to $\psi_D = 0.4$ increases the standard deviation in $\ln(p_t/Y_t)$ by 27.8% (from 1.882 to 2.405) while reducing the standard deviation in the cyclical debt ratio by a more modest 16% (from 6.028 to 5.063).

These findings suggest that while more stringent debt-offsetting dividend tax policy rules may help reduce asymptotic investment frictions, they do so at the cost of increased volatility in equity prices, while only moderately diminishing the volatility of the debt ratio. Additionally, by mitigating asymptotic investment distortions through contemporaneous payout tax adjustments, the probability of entering the investment inactivity region decreases when the government commits to a higher ψ_D in response to debt ratio deviations.

We now turn to analyze how each of the main channels present in the user-cost-of-capital equation (21) explains overall investment and debt ratio volatilities. Figure 3 presents the variance-covariance decomposition of investment for both the RBC and IRR models when dividend taxes are allowed to adjust in response to debt with $\psi_D = 0.2$. The methodology follows a standard variance-covariance framework, where each channel's contribution consists of its own variance and the covariance terms that capture its interaction with other channels. This approach allows for a comprehensive assessment of both direct effects and the spillovers across channels that jointly shape stochastic investment fluctuations.

[27] The significantly higher volatility in asset prices observed in the data compared to the model reflects the 'equity premium puzzle'. However, addressing this long-standing issue is beyond the scope of our paper.

Figure 3: Variance-Covariance Decomposition of Investment Volatility

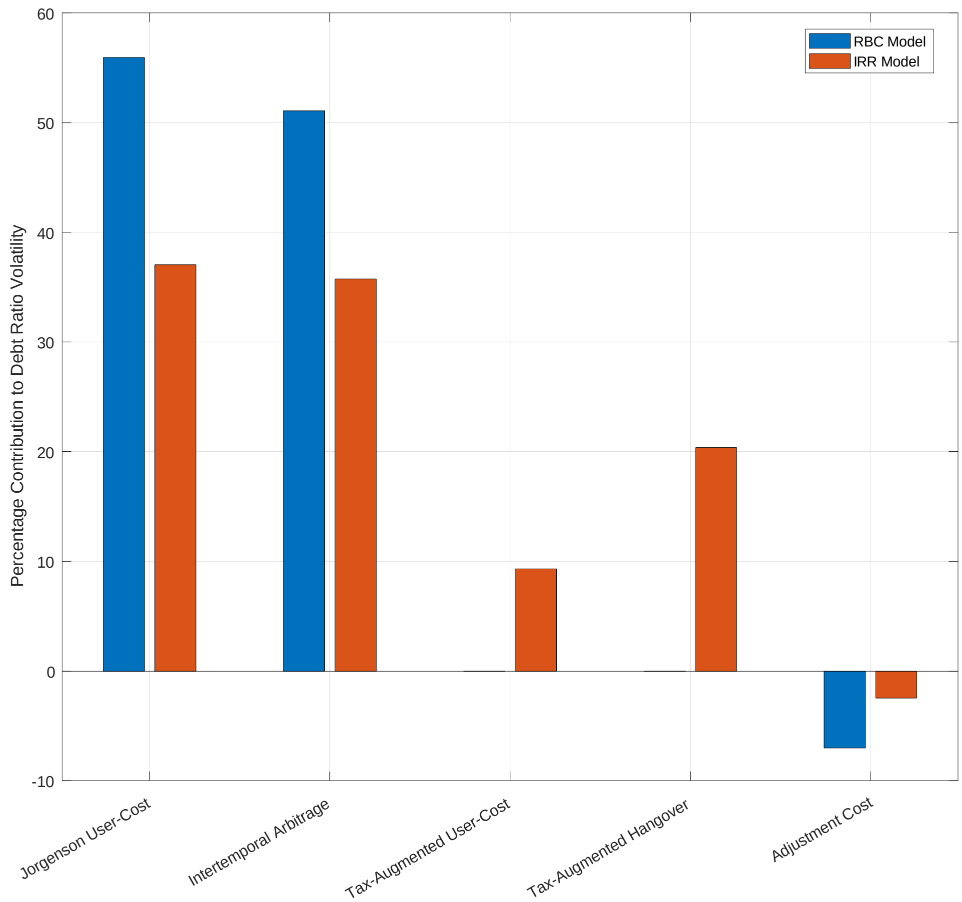


Notes: i) Volatilities are computed from 1,000 simulations keeping A_t and G_t stochastic; ii) In both RBC and IRR models, the dividend tax rule coefficient is set to $\psi_D = 0.2$.

The decomposition reveals significant differences between the two models. In the RBC model, the Jorgenson user-cost channel accounts for the largest share of investment variance, contributing over 50%. This result highlights the dominant role of traditional neoclassical mechanisms, where shifts in the cost of capital primarily drive investment responses. The intertemporal tax arbitrage channel also plays a substantial role, contributing approximately 32%, reflecting forward-looking investment behavior driven by expected tax-adjusted returns.

In contrast, the IRR model reveals a redistribution of variance contributions across channels. While the Jorgenson user-cost and intertemporal tax arbitrage channels remain influential, the introduction of investment irreversibility activates the tax-augmented user-cost and hangover channels that are absent in the RBC framework. Specifically, the tax-augmented user-cost channel contributes about 17% to investment variance, while the tax-augmented hangover channel accounts for roughly 10%. Together, these significant contributions highlight how the interaction between tax adjustments and investment irreversibility explains 27% of total investment fluctuations. The tax-adjusted adjustment cost channel, on the other hand, plays a relatively limited role in both models – particularly in the IRR model, where its influence is nearly negligible.

Figure 4: Variance-Covariance Decomposition of Debt Ratio Volatility



Notes: i) Volatilities are computed from 1,000 simulations keeping A_t and G_t stochastic; ii) In both RBC and IRR models, the dividend tax rule coefficient is set to $\psi_D = 0.2$.

Figure 4 presents the decomposition of the debt ratio volatility, showing how investment irreversibility influences the fiscal transmission mechanism. Compared to the RBC model, the IRR model shows a notable redistribution in the sources of debt fluctuations. The contributions of the

Jorgenson user-cost and intertemporal arbitrage channels decrease significantly under investment irreversibility, falling from approximately 56% and 51% to around 37% and 35%, respectively. This reduction suggests that traditional channels become less dominant when investment is subject to time-varying irreversibility constraints.

Importantly, the tax-adjusted irreversibility channels become substantially more influential in the IRR model. The tax-augmented user-cost channel contributes about 9% to debt ratio volatility, while the tax-augmented hangover channel accounts for approximately 20%. These contributions, absent in the RBC framework, highlight how the interaction between investment irreversibility and fiscal adjustments introduces new channels that can influence debt dynamics.

The adjustment cost channel, although minor, consistently contributes negatively to debt volatility in both models. This negative contribution reflects the stabilizing effect of adjustment costs, which smooth investment and dividend responses and, in turn, reduce fluctuations in debt.

Overall, Figures 3 and 4 together illuminate how investment irreversibility reshapes the underlying drivers of investment and debt ratio volatilities. Through the tax-adjusted user-cost and hangover channels, irreversibility changes how fiscal policy interacts with investment frictions, redirecting the impact of investment and debt fluctuations away from traditional channels toward those directly tied to the emergence of nonconvex investment adjustment costs.

5 Conclusion

How to finance a deteriorating budget and manage high public debt remains a hotly debated issue in both academic and policy circles. Persistently large deficits and rising debt ratios have become prevalent in many advanced economies since the Great Recession, exacerbated by COVID-19 and recent cost-of-living crises. This article has demonstrated how a particular business tax instrument – dividend taxation – affects the macroeconomy, asset prices, and government debt within a tractable RBC model that incorporates empirically-relevant investment frictions. To our knowledge, this study is the first to examine the wide-ranging effects of counterfactual, debt-driven shareholder tax policies and their interactions with partial investment irreversibility.

The results presented in this article highlight the trade-offs policymakers face between minimizing investment and asset pricing distortions in the short-run and ensuring debt and fiscal revenue sustainability through shareholder tax financing schemes in the long-run. Specifically, our findings suggest that temporary dividend tax increases can serve as a gradual and moderate deficit reduction tool, generating higher long-term investment multipliers while containing short-term fiscal costs. However, these policies also introduce short-run distortions that warrant careful consideration by policymakers. To mitigate short-term investment inactivity and excessive asset price volatility, policymakers should gradually phase out payout tax hikes. More broadly, this article advances our understanding of the complex interplay between macroeconomics, corporate finance, and public finance.[28]

Future research should explore the optimal design of debt-driven adjustments to payout, corporate income, and personal tax policies, along with their welfare implications. Comparing dividend tax hikes to alternative fiscal policies would offer a broader perspective on the optimal interaction between tax policy and public debt, as highlighted by Le Grand and Ragot (2025) in their recent contribution to the optimal fiscal policy literature using a heterogeneous agent model. Specifically, extending our positive analysis to compute consumption-equivalent welfare gains could provide further insights into the optimal calibration of dividend tax rules in response to fiscal shocks. Accounting for firm heterogeneity in capital stock and/or productivity (e.g., Veracierto 2002; Gourio and Miao 2011) could further illuminate the aggregate and distributional consequences of dividend taxation, public debt, and investment irreversibility. Finally, examining the links between taxation, costly reversibility, and borrowing constraints (e.g., Wang and Wen 2012; Ghilardi and Zilberman 2024) presents another promising avenue to enhance the model's counterfactual implications for deficit-financing dividend taxes.

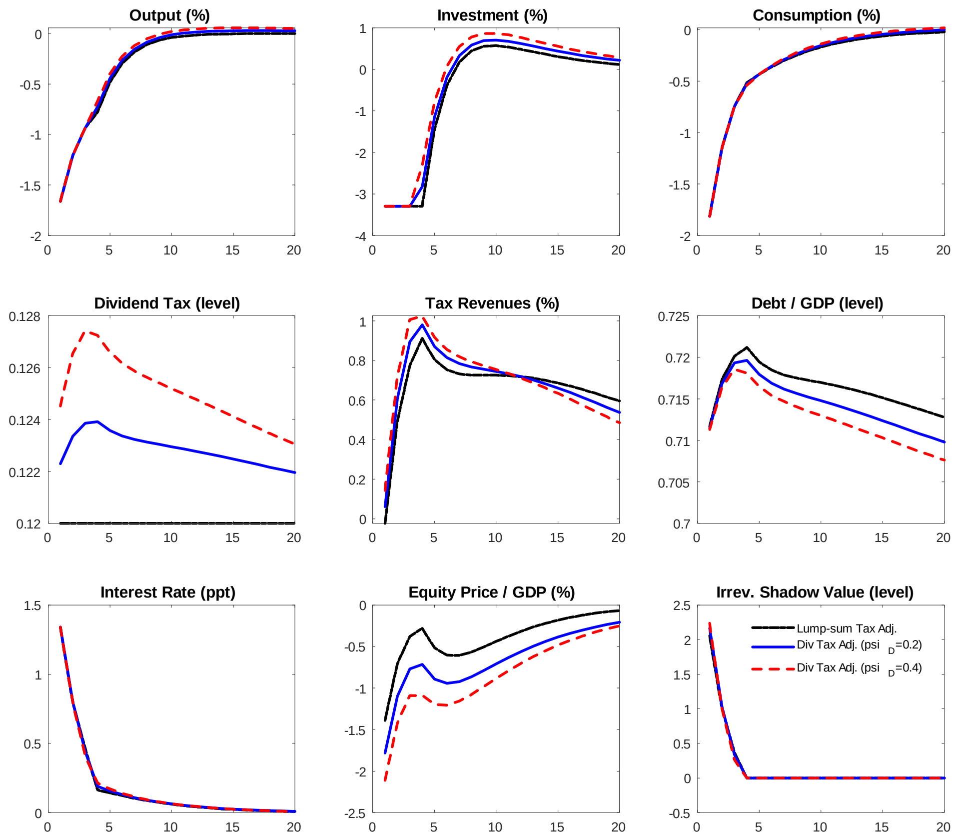
Appendix

Adverse Technology Shock and Tax Financing Regimes

This appendix presents simulations following a negative productivity shock, providing a useful benchmark for comparing the model's behavior across different tax regimes and assessing the role of investment irreversibility. While our main analysis focuses on fiscal financing through dividend taxation, these additional simulations offer insights into how the model responds to exogenous productivity fluctuations and the extent to which investment irreversibility amplifies or dampens economic dynamics over time. Figure A1 illustrates the IRFs of key variables in response to a 3% negative technology shock, resulting in a higher debt ratio and a corresponding increase in one or more of the taxes considered. We plot the same three policy scenarios as in Figure 1 while accounting for investment irreversibility and assuming that in steady-state $\lambda = 0$.

[28] While our analysis focuses on the macroeconomic and fiscal financing effects of dividend taxation, the present RBC framework also provides a structured environment to quantify fiscal trade-offs over time, making it particularly useful for evaluating alternative tax policies in dynamic settings.

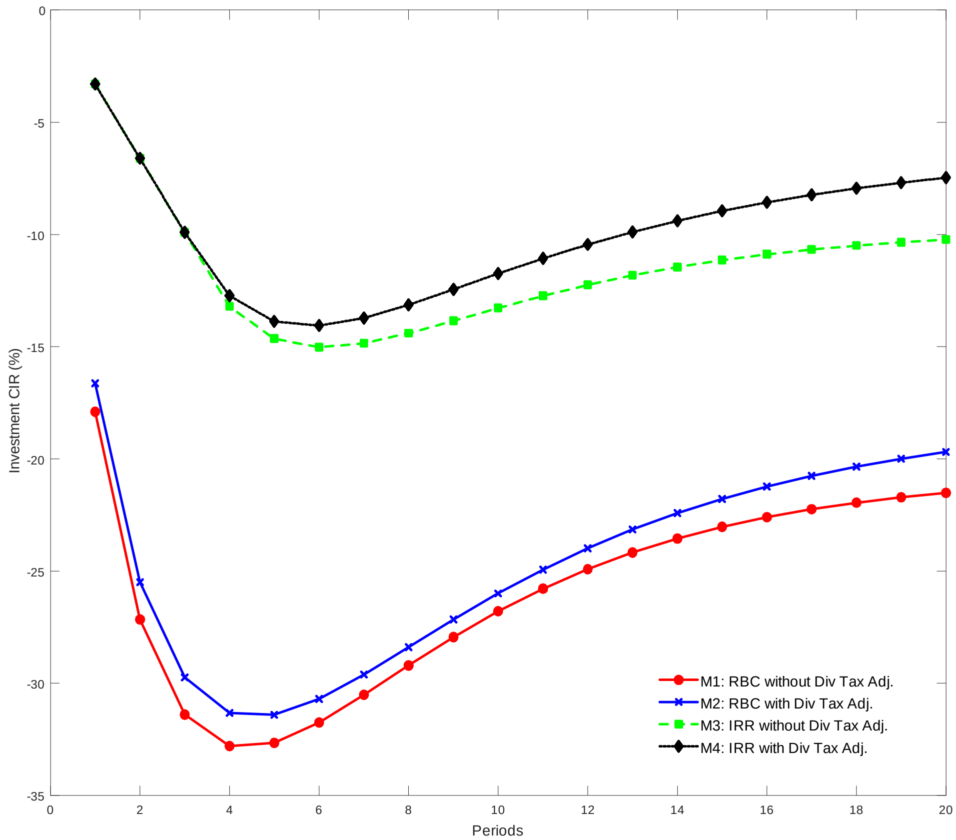
Figure A1: Negative Technology Shock under Alternative Financing Schemes



The decline in technology leads to a reduction in investment substantial enough for the irreversibility constraint to bind even under the lump-sum tax adjustment scenario. Since investment cannot decline by more than 3.3% relative to its long-run value, consumption experiences a sharp drop, and asset prices decrease. The rise in lump-sum taxes produces a negative wealth effect that contributes to the 1.75% fall in consumption.

Allowing payout taxes to respond to the rising debt ratio produces a bust-boom effect in investment similar to that observed with government expenditure shocks, though the quantitative differences are smaller. Equity prices experience the largest declines when dividend taxes respond more strongly to debt. A persistently higher dividend tax rate along the transition path only slightly mitigates debt. Thus, the trade-off between investment and asset pricing distortions and debt dynamics persists even when technology shocks drive the business cycle. Notably, in this case, higher dividend taxes accelerate the economy's recovery from a technology-induced recession. However, due to consumption smoothing, the impact on household spending remains minimal.

Figure A2: Investment CIRs under Different Model Specifications: Negative Technology Shock



We now turn to examine the investment CIRs following the same 3% adverse technology shock to summarize the persistence of investment and the overall effect of the productivity shock over time. We compare the four cases outlined in the government spending shock-induced CIR analysis presented in Figure 2. The outcomes are shown in Figure A2.

The results highlight that models incorporating investment irreversibility (IRR) and dividend tax adjustments exhibit significantly greater investment persistence compared to standard RBC models. The CIR is lowest in the frictionless RBC model (M1) and highest in the model combining both IRR and tax adjustments (M4), indicating that these frictions play a crucial role in extending the duration of investment fluctuations. Baley and Blanco (2025) similarly show that investment irreversibility increases the CIR using a parsimonious investment model but do not examine the effects of dividend taxation.

The persistence in M4 is driven by the three key mechanisms highlighted throughout the main text. First, investment irreversibility delays capital adjustment, causing firms to hold excess capital during downturns and slowing investment recovery. Second, the intertemporal tax arbitrage channel amplifies long-term investment, as firms reduce dividend payouts and reinvest earnings when dividend taxes are temporarily high, leading to a surge in investment when taxes decline as debt stabilizes. Third, the interaction between the user-cost and hangover effects prolongs the investment cycle – initially suppressing investment due to higher expected irreversibility costs but later driving a strong recovery as capital depreciation eases the constraint. Together, these mechanisms demonstrate that dividend tax-financed deficit reduction policies not only influence short-term investment behavior but also shape long-run macroeconomic dynamics by increasing investment persistence and amplifying longer-term capital accumulation.

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