

Macroeconomic Effects of Dividend Taxation with Investment Credit Limits¹

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Background

- What are the long-, medium-, and short-term macroeconomic implications of dividend tax reforms?
- Topical and politically contentious question. Two main prevailing views:
- ‘Traditional’ view: when marginal source of funds is new equity, a tax cut raises the return to capital that is used to distribute dividend and increases aggregate investment (Harberger 1962, Feldstein 1970, and Poterba and Summers 1983).
 - Empirical support for ‘traditional’ view: Auerbach and Hassett (2006) and Campbell et al. (2013) for the U.S, Jacob (2021) for Sweden, and Moon (2022) for South Korea.
- ‘New’ view: permanent tax changes have *no* impact on investment when firms rely on retained earnings to finance new investment (King 1977, Bradford 1981, and McGrattan and Prescott 2005).
 - Empirical support for ‘new’ view following the 2003 JGTRRA: Desai and Goolsbee (2004), Chetty and Saez (2005), and Yagan (2015).

Our Contribution - One Model with All Views

- General equilibrium business cycle framework with firms facing an *occasionally-binding* investment borrowing constraint.
- Dividend taxes and the investment LTV ratio jointly determine the collateral constraint tightness and the firm's financial position.
- Constraint tightness dictates whether dividend taxation conform to the 'traditional' or the 'new' view in the long-run, and whether tax cuts have muted, expansionary, or contractionary in the near-term.
- A dividend tax cut improves the collateralized value of capital through Tobin's q , encourages investment, and spurs the economic activity *up to the point* where the initially binding investment debt limit turns slack.
- When debt constraint applies to *investment loans*, dividend taxes produce direct effects on credit conditions and the real economy in both the long- and short-run (as opposed to Gourio and Miao 2010, 2011 and Santoro and Wei 2011, for example).

Main Results

- Model reconciles competing views on the macroeconomic effects of dividend taxation.
- Steady state: dividend tax cuts increase investment when the economy is credit-constrained ('traditional' view). No impact otherwise ('new' view).
 - Large tax cuts shift firm's financial position from being constrained to unconstrained, thus nullifying the real long-run effects of further cuts or rising LTV ratios.
- Short- to medium-run: tax cuts raise investment initially when constraint is binding, but produce contractionary effects during the slack regime *and/or* following larger tax cuts.
 - Larger temporary tax cuts and looser expected credit conditions dilute the future valuation of collateralized capital, resulting in contractionary macroeconomic effects.
- Interactions between tax shocks and the financial constraint tightness produce state-contingent, non-linear, and asymmetrical macroeconomic dynamics, consistent with empirical evidence.

The Literature and this Paper

- Gourio and Miao (2010, 2011): capital reallocation following dividend tax reforms with firms facing idiosyncratic shocks.
 - We emphasize the role of the investment-credit friction in determining the effectiveness of tax reforms in a representative-agent setup.
 - Occasionally-binding borrowing constraint and size of tax shocks *matter*, and can *reverse* the transitional dynamics following temporary tax adjustments.
- McGrattan and Prescott (2005), House and Shapiro (2006), and Santoro and Wei (2011): macroeconomic effects of corporate tax reforms.
 - Investment limits capture the tight link between credit tightness, dividend taxes, and the LTV ratio - bridges the gap between different views of dividend taxation.
- Atesagaoglu (2012): effects of permanent tax reductions on U.S. corporate debt.
 - We study the impact of dividend tax reforms while allowing for credit regime *switching*.

The Model

- Infinite-horizon discrete-time general equilibrium model with three representative agents: household, corporate firm, and a government.
- Household consumes, invests in corporate shares, and supplies labor along the extensive margin (Hansen 1985). Receives all firm dividends subject to dividend taxation.
- Firm maximizes dividend value, owns the capital stock, and is subject to an *occasionally-binding* collateral constraint tying investment loans to the market-based measure of capital (Wang and Wen 2012; Miao and Wang 2018):

$$I_t \leq \theta q_t K_{t-1},$$

$$\phi_t (\theta q_t K_{t-1} - I_t) = 0; \quad \phi_t \geq 0.$$

- Government levies taxes but maintains a balanced budget through lump-sum transfers to the household.

- q -Theory Equation:

$$q_t = (1 - \tau_t^D) + \phi_t.$$

- ϕ_t drives a wedge between the frictionless valuation of outside capital, $(1 - \tau_t^D)$, and q_t in the credit-constrained economy.
- The presence of an occasionally-binding collateral constraint ($\phi_t \geq 0$) raises the marginal cost of investment, leading the firm to accelerate dividend distributions in order to maintain the equality between the return to investment inside and outside the firm.
- A tax relief raises q_t , relaxes the constraint, and expands I_t up to the point where q is equal the firm's stock market valuation; i.e., $q_t = (1 - \tau_t^D)$.
- Large tax cuts that push the economy towards a slack credit region only serve to raise the firm's valuation and dividend distributions, while inducing the firm to stop investing.

User-Cost-of-Capital Approach

$$u_t = M_{t+1}^{-1} \frac{(1 - \tau_t^D)}{(1 - \tau_{t+1}^D)} \left[1 + \frac{\phi_t}{(1 - \tau_t^D)} \right] - \left[1 + \frac{\phi_{t+1}}{(1 - \tau_{t+1}^D)} \right] [1 - \delta + \theta \phi_{t+1}]$$

- $\phi_t = 0$: a *permanently* lower τ^D leaves u_t *unaffected*, and therefore leaves K and I *unchanged* ('new' view)
- $\phi_t = 0$: a *transitory* tax reduction today relative to tomorrow *raises* u_t and *lowers* I_t - intertemporal tax arbitrage. .
- $\phi_t > 0$ and $\phi_{t+1} \geq 0$, *indefinite* tax changes have *opposing* effects on u_t .
 - Reducing τ^D lowers u_t by relaxing the constraint as a fraction of the market value of capital, $\phi_t / (1 - \tau^D)$.
 - However, decline in u_t is counteracted by the heavier discounting of the constraint and the motivation to increase dividends when τ^D remains low and the friction slack.

Steady State Results 1/3

Proposition

(i) If $\phi = \frac{\delta}{\theta_B} - (1 - \tau^D) > 0$ (binding constraint, external financing), the capital stock, Tobin's q , equity prices, and dividends are given by:

$$\left(\frac{K}{N}\right)_B = \left\{ \frac{\alpha}{\left[1 + \frac{\phi}{(1-\tau^D)}\right] (\beta^{-1} - 1) + \delta} \right\}^{\frac{1}{1-\alpha}},$$

$$q_B = (1 - \tau^D) + \phi = \frac{\delta}{\theta_B}; \quad p_B = \frac{\delta}{\theta_B} K_B$$

$$\bar{D}_B = (1 - \tau^D) \left[\alpha \left(\frac{K}{N}\right)_B^\alpha - \delta \left(\frac{K}{N}\right)_B \right] N.$$

(ii) If $\phi = 0$ (slack constraint, retained earnings financing), equations above collapse to the 'new' view of dividend taxation (McGrattan and Prescott 2005 and Santoro and Wei 2011).

Steady State Results 2/3

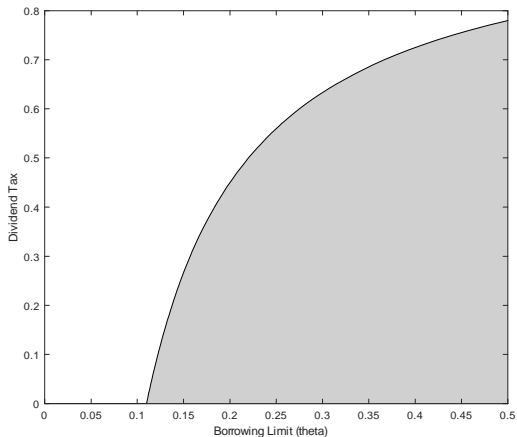
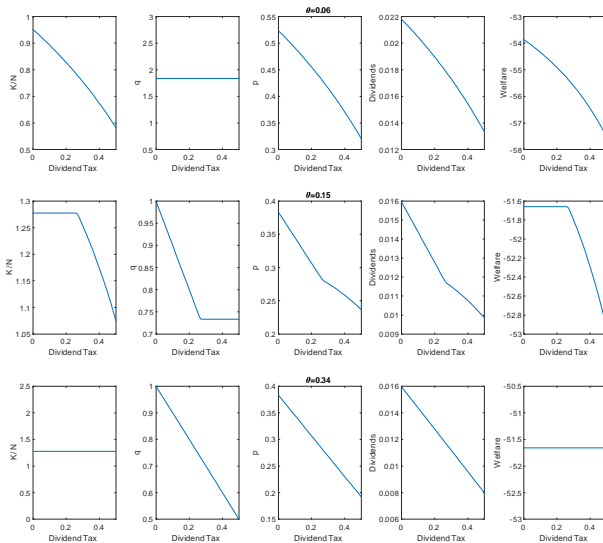
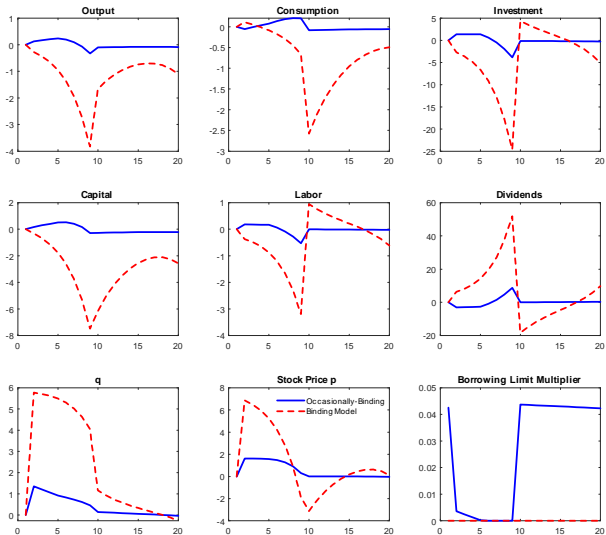


Figure 1: Constrained (white) and unconstrained (grey) equilibrium regions.

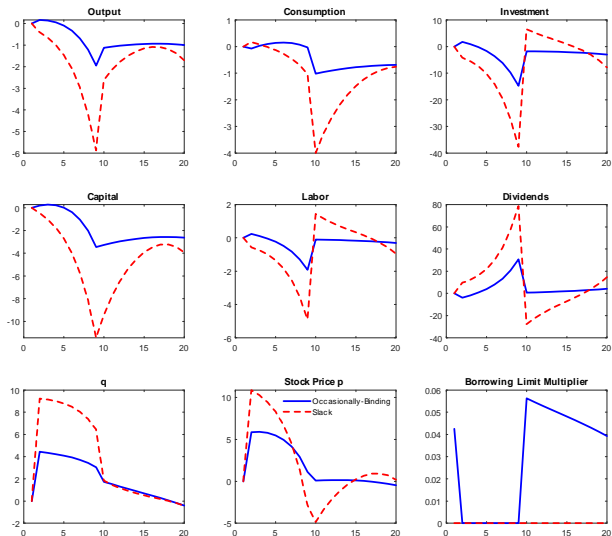
Steady State Results 3/3



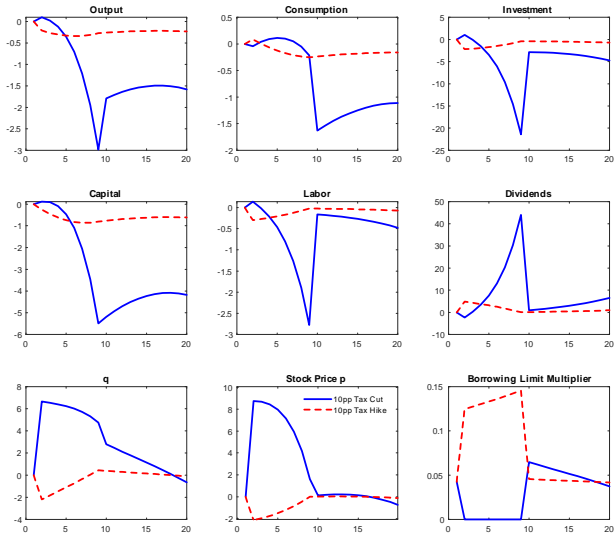
A Temporary 5pp Tax Cut



A Temporary 8pp Tax Cut (2003 Tax Reform)



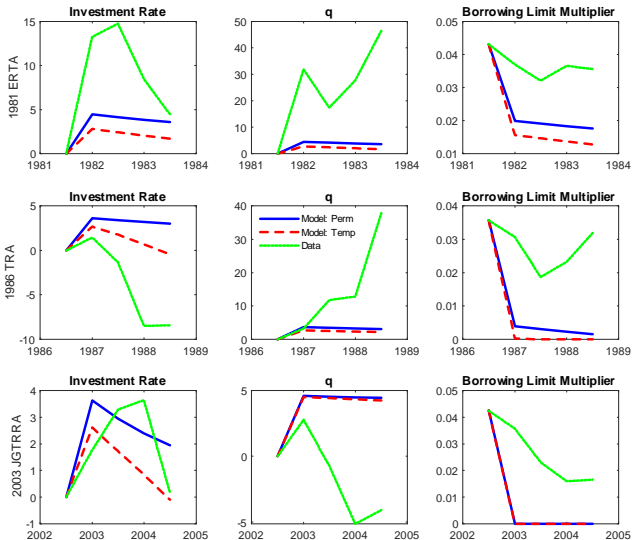
Asymmetric Effects of Dividend Tax Shocks



U.S. Tax Reforms and Model Validation 1/2

- 1981 Economic Recovery Tax Act (ERTA): *effective* τ^D fell from 37% to 29%; 1986 Tax Reform Act (TRA): τ^D fell from 25% to 17%; 2003 JGTRAA: τ^D dropped from 25% to 17% (McGrattan 2023).
- We examine the dynamics of the model after permanent tax reductions (100 periods) and temporary reductions (10 periods), and compare with data.
- Model is recalibrated to match the dividend tax rate, nonresidential investment rate, and q observed during the period *prior* to the announcement of each one of the bills.
- Using propositions, we calculate the tightness of the friction, $\phi = \max(0, q - (1 - \tau^D))$, before the tax reforms. ϕ proxied by credit spread.
- Key finding: stimulative effects of tax reliefs are limited beyond the point at which the credit constraint turns slack and/or when the economy starts from a less restrictive credit environment.

U.S. Tax Reforms and Model Validation 2/2



Conclusions

- General equilibrium business cycle framework that connects different views on the macroeconomic effects of dividend taxation by introducing an occasionally-binding investment credit limit.
- The impact of changes in dividend tax policies on the economic activity can be varied and contradictory, depending on the size of the reforms, their expected time span, and the permanent and temporary financial conditions faced by firms.
- The interplay between taxation and the LTV ratio determines the effectiveness of tax cuts in stimulating real variables in the deterministic steady state.
- In the short-run, the occasionally-binding debt constraint can explain why dividend tax changes produce state-dependent and non-linear dynamics as well as asymmetric macroeconomic outcomes, consistent with empirical evidence.