Political Economy in a Contestable Democracy: The Case of Dividend Taxation*

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Abstract

We analyze the dynamic political game between two rival parties that have different preferences over macroeconomic outcomes and thus implement different dividend tax policies when they are in power. Macroeconomic outcomes are driven by the behavior of private firms, which in turn depends on current and expected future tax rates: Payouts are lower and aggregate investment is higher the higher the current party's tax rate compared to the expected future rate under its rival.

Political parties strategically internalize these interactions and set socially excessive or socially insufficient tax rates, depending on their relative valuation of aggregate investment versus dividend payouts.

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1 Introduction

Dividend taxation affects firms differently depending on their marginal source of finance (Stiglitz, 1973; Sinn, 1991). For young firms that raise money from equity markets, dividend taxes are distortionary: they reduce the payoffs that equity investors receive from firm investment; therefore investors are less willing to inject new equity into firms.

On the other hand, for the investment decisions of mature firms that no longer access equity markets, the level of dividend taxes is irrelevant because their marginal source of finance is retained earnings (King, 1977; Auerbach, 1979): when a firm decides whether to pay out dividends now or invest and pay out the proceeds in the future, both potential payoffs are reduced by the same factor, and the dividend tax rate hence cancels out of the decision problem so long as its level remains constant.

By contrast, as pointed out in Korinek and Stiglitz (2008), expected changes in dividend taxation create significant opportunities for intertemporal tax arbitrage that affect the investment decisions of both young and mature firms: if for example firms expect a reduction in dividend taxes, they have an incentive to postpone dividend payments and pay out less cash in the periods before the cut so as to save on investors' taxes. This raises firms' steady state cash holdings. In an environment where internal and external funds are imperfect substitutes, higher cash holdings reduce the cost of capital of mature firms and therefore increase investment.

Since the majority of firms in a developed economy are mature and no longer access equity markets, Korinek and Stiglitz (2008) demonstrate that the effects of changes in dividend taxation on aggregate investment are driven primarily by the intertemporal arbitrage behavior of mature firms rather than by the efficiency effects of dividend taxation on young firms. For example, the temporary efficiency gains that young firms derive from a temporary dividend tax cut are likely to be an order of a magnitude smaller than the distortion created by mature firms' intertemporal arbitrage: mature firms will pay out larger dividends before the tax cut expires and thereby reduce their working capital below the optimal level, which will entail a period of tighter borrowing constraints and suboptimally low aggregate investment. And even if a certain policy, e.g. a tax cut, is announced, or even *enacted*, as a permanent policy measure, policymakers and policies change over time in contestable democracies. Market participants know this, and take this into account in determining their behavior; and policymakers know that market participants know this, and take it into account in setting their policies.

As a result, any analysis of changes in dividend tax policy has to put the arbitrage behavior of mature firms at the center stage. The effects of any dividend tax policy depend to a major extent on the expectation of private sector agents regarding future dividend tax policies. It is therefore wrong to analyze the effects of a policy measure, e.g. a tax cut, as if it was permanent.

The history of dividend taxation in the United States over the past three decades offers a powerful example of the frequency and magnitude of dividend tax changes in a contestable democracy, and thus of the importance of these considerations for the welfare analysis of dividend taxation: when Reagan entered the White House, the top marginal tax rate on dividend income was 70%; several cuts later, when he left office, it was 28%. Under the Clinton administration, top marginal dividend taxes were raised up to 40%; the Bush tax cut of 2003 reduced them to 15% (Damodaran, 2003). Going forward, the leading Democratic candidates for the 2008 presidential election agree on letting Bush's tax cut on dividends expire.

This paper analyzes the effects of dividend tax policy while explicitly taking into account expectations of future policy changes. We model a contestable democracy with two parties, social democrats and conservatives, where party rule is determined by an exogenous Markov process.When a party comes to power, it implements a dividend tax rate that depends on the party's preferences over taxation and over the effects of the tax change on macroeconomic outcomes such as aggregate investment.[1] In assessing this latter factor, the party has to take into account not only its expectations about private agents' response to its own tax rate, but also about private agents' response to the rival party's (expected) tax rate, which may in turn depend on the tax rate that the party in power sets. This leads to a dynamic rational expectations game between the two parties, with the private sector as a third actor.

The results are intuitive: Under a conservative regime, when dividend taxes are low, firms expect that the next move will be a tax increase; therefore they pay out higher dividends while taxes are still low. This reduces their cash holdings below the equilibrium value and leads to a decline in investment and output. Firms' incentive to engage in intertemporal tax arbitrage is larger the greater the expected tax increase when social democrats come to power, i.e. the larger the difference in the two parties' tax rates. If the primary concern of conservatives is to mitigate the decline in investment and output under their rule, then they raise the dividend tax rate (beyond the level that they would set if they were in power permanently) so as to reduce the difference in tax rates and the incentive for tax arbitrage. Alternatively, if they are more concerned with large after-tax payouts to shareholders, they would lower the dividend tax rate under their regime in order to induce firms to make large payouts under their low-tax regime.

Under social democratic rule, by contrast, firms expect that the next change in dividend taxes will be a cut; they reduce dividend payments so as to postpone some of their distributions until after the expected dividend tax cut. This leads to an increase in their working capital that raises investment and output. Again, these positive macroeconomic effects are increasing in the magnitude of the expected tax cut when conservatives come to power. If social democrats are mainly concerned with high investment and output, they would thus raise taxes beyond the preferred level that they would set if they were in power permanently. On the other hand, if they place relatively more weight on dividend payouts and the associated government revenue, they would lower their tax rate as compared to their preferred level so as to incite firms to increase their dividend payments under the social democratic regime.

In the non-cooperative equilibrium between the two parties, both parties choose

[1] We implicitly assume that the median voter theorem does not hold, e.g. because parties care not only about being in power, but also about how well they implement the preferences of a set of core constituents.

inefficient tax rates, imposing externalities on each other by affecting aggregate investment and payouts under their rival's regime *through a tax rate effect*. Depending on the two parties' objective functions, these externalities can be either positive or negative. The non-cooperative equilibrium is obviously inefficient; there exists a cooperative agreement between the two parties, which makes both of them better off. Under certain technical conditions, it is possible for both parties to agree on a common dividend tax rate.

Our theoretical predictions on investment and growth are consistent with the empirical finding for industrialized countries that macroeconomic indicators such as growth and employment tend to be higher under social democratic governments than under conservative governments, as first documented by Hibbs (1977). Traditional explanations (see e.g. Alesina, 1987; Alesina and Rosenthal, 1989) mostly attributed the phenomenon to a difference in attitudes towards monetary policy, i.e. under sticky wages higher inflation by social democrats can temporarily raise output. By contrast, we show that the pattern is also consistent with different attitudes towards capital taxation – under the high-tax regime of social democrats, companies pay out smaller dividends and accumulate higher working capital, which stimulates investment.

The series of papers by Alesina (1987, 1988) first introduced a formal analysis of an economy in which party rule switches stochastically between two candidates and analyzed the resulting political equilibria. In these papers, the real effects of changes in government arose from the uncertainty component contained in switches in party rule, e.g. from the difference between expected and implemented inflation rates. By contrast, our analysis of the effects of changes in capital taxation emphasizes an alternative channel, the possibility for firms to engage in intertemporal arbitrage between two tax policy regimes so as to lower their overall tax burden. This requires not only that firms form expectations about what will happen in future periods, but also that they keep track of what happened in the past, since the level of accumulated cash balances affects their optimal future behavior.

A related approach has been followed by Persson and Svensson (1989) and Alesina and Tabellini (1990) who analyze the optimal fiscal policy in a game between two parties that stochastically switch power and have different preferences on public goods. They find that a party can induce its successor to spend less on an unwanted public good by leaving a stock of government debt that is higher than what would be optimal with a single policymaker. These two papers analyze the strategic interactions between two political parties. We add an analysis of how private agents optimally respond to the expectation of changing government policies by taking advantage of intertemporal arbitrage opportunities; and how the two political parties in turn respond to the arising strategic effects of their tax policies.

We set up the basic model in section 2, which analyzes the behavior of private firms in an environment of two parties (social democrats, denoted S, and conservatives, denoted C) that change power according to a Markov process and that each implement an exogenously given dividend tax rate when they are in power. Section 3 discusses the two parties' preferences and endogenizes their choice of tax rates. Section 4 presents a solution to this dynamic game in a simplified setup. Section 5 investigates the potential for cooperative solutions. Finally, section 6 discusses generalizations of the political game we analyzed, and section 7 concludes.

2 Firm Behavior

2.1 Model Setup

We model the behavior of a representative private firm as a simplified version of the framework presented in Korinek and Stiglitz (2008): the firm holds cash balances M_t to take advantage of investment opportunities and produce output.[2]

Each period, the firm decides how much of its production to pay out in the form of dividends D_t, of which a fraction τ_t has to be paid in taxes. The remaining cash holdings are invested $I_t = M_t - D_t$ and yield a payoff according to the neoclassical production function $F(I_t) = AI_t^\alpha$ at the end of the period, while I_t depreciates fully. We can summarize the firm's maximization problem as:

$$
\begin{aligned}
V(M_0) = \max_{\{D_t\}_{t=0}^{\infty}} E\left\{\sum_{t=0}^{\infty} \beta^t (1-\tau_t) D_t\right\} \qquad (1) \\
\text{s.t. } M_{t+1} = F(M_t - D_t) \\
D_t \geq 0 \text{with} \qquad M_0 > 0 \text{ given.}
\end{aligned}
$$

The constraints capture the law of motion for the firm's cash holdings and the dividend non-negativity constraint.

If the dividend tax rate is constant, i.e. $\tau_t \equiv \tau\ \forall t$, it can easily be seen that the tax rate can be dropped from the maximization problem in (1); therefore the firm's optimal behavior does not depend on the level of the dividend tax rate. It can be shown that there is a steady state value of cash balances M^* such that firms retain and reinvest all their cash earnings while their cash holdings are below that value, i.e. $D_t = 0$ for $M_t < M^*$. They pay out all earnings in excess of this threshold in the form of dividends and only retain and invest M^* once they have reached or surpassed this threshold, i.e. $D_t = M_t - M^*$ for $M_t \geq M^*$. The level of M^* is defined as the point where the discounted return of investment is unity:

$$\beta F'(M^*) = 1 \qquad (2)$$

While the firms' behavior and the level of M^* is independent of the dividend tax rate, the value function $V(M_t)$ of the firm represents investors' present discounted value of after-tax dividends, so $1-\tau$ is a scale factor for the firm's value. The function is strictly increasing and strictly concave with slope $V' > 1-\tau$ for $M_t < M^*$ and linear with slope $1-\tau$ for $M_t \geq M^*$.

[2] We abstract from equity markets in this paper, following the finding in Korinek and Stiglitz (2008) that the macroeconomic effects of anticipated changes in dividend taxation are driven mainly by mature firms or growing firms that no longer access equity markets. Introducing debt markets would not affect our results (see e.g. Gourio and Miao, 2007). In fact, we can interpret the production function in our model as implicitly taking into account a certain amount of leverage.

2.2 Changing Dividend Tax Rates

A firm that expects a dividend tax cut postpones some of its dividend payouts until after the cut and, in doing so, accumulates cash holdings beyond M^* so as to save on dividend taxes. The higher cash holdings in turn imply that the firm invests and produces more in the relevant periods.[3] Conversely, when a firm expects a dividend tax increase, it accelerates dividend payments and pays out more under the current low tax rate. This depresses firm cash holdings below M^* and reduces investment and output.

This paper analyzes the situation where there are two representative parties in the political spectrum, labeled conservatives C and social democrats S. In this section, we assume that each has committed itself to a tax rate of τ_C and τ_S respectively, where $\tau_C < \tau_S$. (In the following sections, we will endogenize this choice.) For analytical simplicity, party rule follows an exogenous symmetric Markov process with a matrix of transition probabilities $T = \begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}$, i.e. there is a switch in party rule every period.[4] We investigate the dynamic consequences for investment, output, and dividend payments in the periods in which the two parties are in office.

Suppose first that the social democratic party is in power. Then firms recognize that tax rates will be lowered from τ_S to τ_C next period. Accordingly, firms increase their holdings of cash and invest more in the current period, thereby raising output. We denote firms' optimal cash balances under social democratic rule as M_S^*, where naturally $M_S^* > M^*$. When the economy is under social democratic rule, firms will only pay out their cash holdings in excess of M_S^*.

When the conservatives come to power, taxes are immediately reduced to τ_C, and mature firms instantaneously recognize that they have too much cash. In anticipation of the impending tax increase when social democrats take office the next time, they pay out larger dividends now, bringing their cash holdings down to $M_C^* < M^*$. As a result, both investment and output fall. When the social democrats come to power again the next time, there is an immediate tax increase, dividend payments get reduced, and cash balances increase, as do investment and output.

This short description illustrates the anomalous consequences of intertemporal tax arbitrage in the given setting: while dividend payments are lower under the high tax regime of the social democrats, output and investment are higher, and vice versa under the regime of the conservatives. Through their commitment to lower taxes,

[3] This implicitly assumes that firms have no alternative store of value. We show in Korinek and Stiglitz (2008) that similar conclusions hold if the firm has some access to asset markets, so long as it is in equilibrium capital constrained, as suggested by e.g. Stiglitz and Weiss (1981) and Myers and Majluf (1984).

[4] More generally, party rule should follow a probabilistic process, and we would expect a party that better implements the preferences of its constituents to stay in power for longer. While this would introduce additional strategic considerations for parties, it would not alter the qualitative findings presented in this paper. See e.g. Krusell et al (1997) for an analysis of a politico-economic equilibrium where political decisionmakers internalize their effect on the choice of future decisionmakers. However, it can be argued that the level of dividend taxation is such a specific issue that elections are not usually won or lost over this single topic.

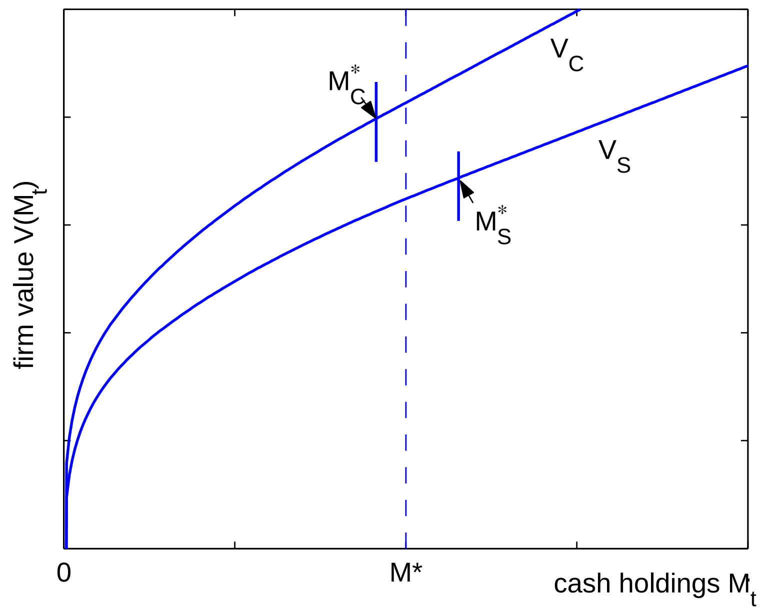

Figure 1: Value Function of Firms Under Conservative and Social Democratic Governments: Party rule changes every period. The conservative government cuts taxes upon entering office, which shifts the value function up to V_C. However, because of the impending dividend tax increase when the next social democratic government comes to power, firms' optimal cash holdings are depressed to M_C^*. The opposite results apply for the value function V_S and optimal cash holdings M_S^* under social democratic rule.

the conservatives decrease dividend payments but help investment under the social democratic rule. Through their commitment to raise taxes, the social democrats hurt investment under the conservatives, but raise dividend payouts. Parties therefore exert externalities on each other.

Analytically, let us denote a firm's value function under a conservative government as $V_C(M_t)$, and that under a social democratic government as $V_S(M_t)$. We can then find for $i, j \in \{C, S\}, i \neq j$:

$$V_i(M_t) = \max_{D_t}(1-\tau_i)D_t + \beta V_j\left(F(M_t - D_t)\right)$$

Taking the first order condition of this maximization problem, we obtain

$$1 - \tau_i = \beta V_j'\left(F(M_i^*)\right) F'(M_i^*) \tag{3}$$

Firms hold less cash under conservative rule than under social democratic rule, or $M_C^* < M_S^*$. This implies that $F(M_S^*) > M_C^*$; under a conservative regime output is always large enough for a firm to pay out marginal earnings in the form of dividends at a tax rate τ_C, and so $V_C'(F(M_S^*)) = 1 - \tau_C$. For typical parameter values, M_C^* is close enough to M_S^* so that $F(M_C^*) \geq M_S^*$.[5] As a result, the marginal earnings of a firm

[5]The larger the gap between the tax rates of the two parties,the more incentive to arbitrage, and hence the larger the difference between M_C^* and M_S^*. The technical condition for the above inequality to hold is that $1 - \tau_S \geq (\alpha\beta)^{\frac{1-\alpha}{1+\alpha}} \cdot (1 - \tau_C)$, which is fulfilled for typical parameter values.

under social democratic rule are paid out at a tax rate of τ_S, implying that the slope of the value function is $V_S'(F(M_C^*)) = 1 - \tau_S$. We can use these results in equation (3) to derive the marginal value of the optimum cash balances M_i^* under the regime of each party $i \in \{C, S\}$ as

$$\beta\,(1-\tau_j)\,F'(M_i^*) = 1 - \tau_i$$

$$\text{or} \qquad M_i^* = (F')^{-1}\,(R_i^*) \qquad \text{where} \qquad R_i^* = \frac{1}{\beta}\cdot\frac{1-\tau_i}{1-\tau_j} \tag{4}$$

R_i represents the required return on investment under party i's rule. If tax rates were expected to remain constant, then no distortion would be introduced and the standard optimality condition for investment $F'(M^*) = R^* = 1/\beta$ would hold. If tax rates under the social democratic regime are higher, then $R_S^* < R^* < R_C^*$, and consequently the firm's optimal cash holdings and investment satisfy $M_C^* < M^* < M_S^*$.

We have plotted an example of a firm's value functions as well as M_C^* and M_S^* under constant switching between these two tax regimes in figure 1. The figure also illustrates some implications for aggregate investment dynamics in an economy where the dividend tax rate fluctuates between different tax rates: since $(F')^{-1}$ and $F[(F')^{-1}]$ are both convex[6], average investment and output are actually larger in an economy where dividend tax rates fluctuate than in one with a constant tax rate.[7]

2.3 Effects of Changes in Tax Rates

When a party raises its dividend tax rate, the optimum amount of cash holdings that firms retain under its regime M_i^* rises, as reflected in a lower required marginal return to investment R_i^*. This is because the firm has a reduced incentive to pay out dividends now and a comparatively higher incentive to pay out dividends under the rival party's regime. These conclusions also apply to firm output $F(M_i^*)$. By the same token, when party j raises dividend taxes, the optimal level of cash holdings M_i^* under its rival's rule fall.

Using equation (4) it is easy to confirm these results analytically. Note first that a higher tax rate τ_i lowers the required return R_i^* under party i's regime and raises the required return R_j^* under its rival's regime:

$$\frac{dR_i^*}{d\tau_i} = -\frac{1}{\beta(1-\tau_j)} < 0 \qquad \text{and} \qquad \frac{dR_i^*}{d\tau_j} = \frac{1-\tau_i}{\beta(1-\tau_j)^2} > 0$$

The resulting impact on optimal cash holdings and investment is therefore

$$\frac{dM_i^*}{d\tau_i} = [(F')^{-1}]'\cdot\frac{dR_i^*}{d\tau_i} > 0 \qquad \text{and} \qquad \frac{dM_i^*}{d\tau_j} = [(F')^{-1}]'\cdot\frac{dR_i^*}{d\tau_j} < 0 \tag{5}$$

[6] The relevant two functions are $(F')^{-1}(R) = \left(\frac{\alpha A}{R}\right)^{\frac{1}{1-\alpha}}$ and $F[(F')^{-1}](R) = A\left(\frac{\alpha A}{R}\right)^{\frac{\alpha}{1-\alpha}}$.

[7] Depending on private agents' utility function, this could lead to cases where random taxation yields welfare-superior outcomes, as discussed in Stiglitz (1982).

The firm's dividend payout policy is to distribute all output $F(M_j^*)$ in excess of M_i^*, the optimal investment for the next period:

$$D_i^* = F(M_j^*) - M_i^*$$

A straightforward implication of the derivatives on M_i^* above is that for both parties $i \in \{C, S\}$

$$\frac{dD_i}{d\tau_i} < 0 \qquad \text{and} \qquad \frac{dD_i}{d\tau_j} > 0$$

The higher dividend taxation under party i's rule compared to its rival, the more incentive firms have to shift dividend payments into the rival's regime.

This implies the following response of government revenue to dividend taxation:

$$\frac{d\tau_i D_i}{d\tau_i} = D_i + \tau_i \left(\frac{dD_i}{d\tau_i} \right) \tag{6}$$

The first term reflects that for any given level of dividend payments, a higher tax rate raises government revenue. The second term captures that raising the tax rate under party i's regime induces firms to shift their dividend payments into periods when party j is in office; it is zero for $\tau_i = 0$ and negative otherwise. For small τ_i, the first effect clearly dominates. As τ_i increases, the incentive for firms to arbitrage rises. At some point the second term outweighs the first term and the marginal revenue effect of raising party i's dividend tax rate turns negative. The relationship between dividend tax revenue under the tax rate under party i's rule is thus hump-shaped. On the other hand, if party j raises its dividend tax rate, firms are induced to shift some of their payments towards party i's regime. As a result, party i's dividend tax revenue unambiguously increases when party j raises its tax rate:

$$\frac{d\tau_i D_i}{d\tau_j} = \tau_i \cdot \frac{dD_i}{d\tau_j} > 0$$

The effects of changes in one party's tax rate on shareholders' after-tax return under the two parties' regimes can be determined analogously:

$$\frac{d(1-\tau_i)D_i}{d\tau_i} = (1-\tau_i) \left(\frac{dD_i}{d\tau_i} \right) - D_i < 0 \tag{7}$$

The first term captures again that raising dividend taxes under party i's rule induces firms to shift their dividends to party j's regime. The second term reflects that for any given payout, a higher dividend tax rate reduces the after-tax income of shareholders. Shareholders' after-tax income under party i's regime is thus unambiguously reduced when party i increases its tax rate.

The opposite conclusions hold when party j raises its tax rate: this creates an incentive for firms to shift some of their payouts into party i's regime; therefore shareholders' after-tax income under party j rises unambiguously when party i raises its tax rate:

$$\frac{d(1-\tau_i)D_i}{d\tau_j} = (1-\tau_i) \left(\frac{dD_i}{d\tau_j} \right) > 0$$

In summary, when a party raises the dividend tax under its regime, this induces firms to increase their cash holdings and investment and to lower their dividends, which reduces investors' after-tax dividend income, but has ambiguous effects on the government's tax revenue. Furthermore, the party imposes an externality on its rival that leads to lower cash balances and lower investment, but higher dividends, higher government revenue and higher after-tax returns for investors under the rival's regime.

3 Parties' Optimal Tax Rates

The previous section assumed that the tax rates of each party were determined exogenously and analyzed the resulting equilibrium; but in fact, tax rates are always a matter of choice. In this section, we model the game between a conservative party C and a social democratic party S in a perfect information setup (that is, the parties have perfect information about their rival, and market participants' reponses, and about the nature of the Markovian process governing regime switches, but obviously, no one knows when a regime switch will occur). As parties choose a tax rate, they recognize that they cannot bind their rival, that firms know that, and that this will affect the behavioral response to their policies. Heuristically, this means that the conservatives recognize that the lower they set their taxes, given the policy of the social democrats, the more investors will fear a regime change that brings the social democrats to power; the higher the dividend payments and the lower investment during conservatives' rule. Hence, their optimal tax rate is higher than it would be without strategic considerations.

By the same token, the social democrats recognize that the higher they set their taxes, given the policy of the conservatives, the lower dividends firms pay and the higher cash balances they accumulate, which enables firms to invest more. Social democrats thus gain from higher dividend tax rates in terms of both investment and output. Hence, the presence of conservatives who will subsequently lower taxes means that social democrats impose taxes that are even higher than they would be if social democrats were permanently in power.

The bias towards high taxes is further exacerbated if each party takes into account the consequences of its actions on the *relative* performance of the economy under its regime. That is, social democrats will raise taxes, recognizing not only that this improves the economy while they are in office, but also that it worsens the economy during their rival's regime. The conservatives raise taxes further, recognizing that in doing so, they lower the gain that the social democrats have while in office.[8]

Let us now define parties' preferences formally. At the most general level, we can postulate that each party's utility is a function of a vector $Z_t = (I_t, Y_t, D_t, \tau_t D_t, (1 - \tau_t) D_t)$ of aggregate investment, output, payouts, government revenue and investor

[8] Such a focus on relative performance might be particularly important in determining voting behavior. In the analysis of this paper, however, we assume that this issue does not affect the probabilities of getting elected or reelected – this would complicate the analysis further without altering the qualitative results.

income in every period[9], together with an indicator function 1_t^i that takes the value one when party i is in power and zero otherwise. We can then denote party i's expected utility as $EU^i\left(\{Z_s, 1_s^i\}_{s=t}^{\infty}\right)$. Parties have rational expectations about firm behavior and the macroeconomic implications of this behavior. A party can be more sensitive to the value of macro variables in the periods in which it is in office; alternatively, it may attach value to differences between the value of the relevant variables when it is in office and when it is not.

We assume here that the conservative party reflects more the interests of the corporate sector and of shareholders and therefore prefers lower tax rates, which lead to larger after-tax dividends, as captured by the derivative (7). The other party, the social democrats, prefers a higher tax rate, which raises aggregate investment as derived in equation (5), thereby creating more jobs, and raises more government revenue as captured by (6), enabling higher expenditure on public goods.

Each party controls only the tax rate τ_t when it is in power, i.e. when $1_t^i = 1$. The party that is in power sets the dividend tax rate that maximizes its expected utility:

$$\max_{\tau_i} EU^i\left(\{Z_s, 1_s^i\}_{s=t}^{\infty}\right) \tag{8}$$

The vector Z_t is generated by the representative firm's behavior, which depends in turn on its cash holdings M_t, the current dividend tax rate, and on the firm's beliefs about future dividend taxes.

$$Z_t = Z\left(M_t; \{\tau_s\}_{s=t}^{\infty}\right)$$

The firm forms rational expectations about parties' dividend tax policies and about future changes in party rule, i.e. it is aware that future dividend tax rates are the result of parties' optimizing behavior. It chooses its optimal dividend payment D_t and cash balances M_t by solving maximization problem (1).

The result is an infinite horizon dynamic rational expectations game between the two parties and the representative firm. An equilibrium in this game can be characterized as

- a set of tax rates $\{\tau_s\}_{s=t}^{\infty}$ which satisfy in every period s the optimization problem (8) of the party i in power, given party i's rational beliefs on the future behavior of the representative firm and the rival party

- a set of macroeconomic variables $\{Z_s\}_{s=t}^{\infty}$ which satisfy the firm's optimization problem (1) in every period, given its rational beliefs on current and future dividend tax policy

4 Non-Cooperative Solution

In this section, we analyze the non-cooperative Nash equilibrium, in which both parties choose a dividend tax rate that is the best response to their rival's tax rate. We

[9] In a more general model, Z_t could also be extended to contain other variables such as wages.

limit our attention to equilibria in which each party implements a single tax rate when it comes to power, i.e. we abstract from strategies that involve randomization or variations in tax rates over time.[10]

In order to characterize the game in more detail, let us make a number of simplifying assumptions. First, suppose that whenever conservatives or social democrats are in power, they implement the constant tax rates τ_C and τ_S respectively. We can then denote each party's utility function from equation (8) in the reduced form $U^i(\tau_C, \tau_S)$, reflecting the party's preferences over the macroeconomic implications that result from a given pair of dividend taxes (τ_C, τ_S). As we discussed above, these reduced-form utility functions reflect in our example that both parties place a significant weight on firm investment and output.

The optimal tax rate of the party in power also depends on its beliefs of what its rival will do when it comes to power.[11] Furthermore, a party's choice of tax rates today also depends on whether it can commit to this rate for the indefinite future, or whether it knows that it will re-optimize when it comes to power the next time. In either case, the party is thinking through the full consequences of its choice, knowing the Markovian structure of the model. This implies that a party's optimal policy depends on whether its rival can commit to a certain tax rate or not. We analyze the case that both parties cannot commit to a tax rate here, and we leave the remaining three cases to future work.

We assume that each party's utility function is concave in its own tax rate so that there is a unique optimal tax rate for a given level of the rival's tax rate, i.e. $U^C_{11} < 0$ and $U^S_{11} < 0$. Furthermore, we define the preferred tax rate of conservatives τ_C^* as

$$\tau_C^* = \arg\max_{\tau_C} U^C(\tau_C, \tau_C)$$

This is the tax rate which, if the conservatives could choose a single tax rate forever, would maximize their welfare. We define τ_S^* analogously.[12] Assume furthermore that

$$\tau_C^* < \tau_S^*$$

Overall, the conservative party prefers lower tax rates. This might be because they weigh the capital income received by their constituents (net of taxes) more highly or

[10]While this restriction does not necessarily reflect parties' optimal behavior in the absence of legislative constraints, it can be justified by the observation that dividend tax rates have changed only infrequently in the past, perhaps because bringing the necessary measure through the legislative branch of government requires a certain fixed cost in terms of political capital.

[11]In a more extended version of this model, optimal policies could depend on how long the previous party was in power (which would be summarized through a state variable such as the firm's cash balances), as well as on more complex beliefs, not just about what policies a party's successor will undertake when it is in power, but what the party itself will do when it regains power, and what its rival will do when it retakes power, and so forth. The whole past history and details of future beliefs matter. But given our simplifying assumption, the structure of the game is Markovian, so that each party knows that what is optimal for it to do now (given expectations of its rival's actions) is the same as what is optimal when it retakes power and similarly for its rival.

[12]We discussed in the previous section that it might be optimal for a party to randomly switch tax rates under some parameter values, even if it knew that it would stay in power forever. However, in the analysis here we rule out the possibility that random taxation can increase a party's welfare.

because they value the public goods that can be financed by government revenue less in their utility function. In figure 2, the tax rates τ_C^* and τ_S^* are represented by crosses on the dotted diagonal that is defined by $\tau_S = \tau_C$.

We discussed in a section 2 that expectations of a dividend tax increase induce firms to pay out more in the current period, thereby reducing investment and output. In terms of parties' utility functions, this implies $U_2^i < 0$, i.e. the social democrats' commitment to raise dividend taxes imposes a negative externality on conservatives, since social democrats pick a tax rate $\tau_S > \tau_C^*$. By the same token, expectations of a dividend tax cut raise current investment and output, and conservatives impose a positive externality on social democrats by setting a tax rate $\tau_C < \tau_S^*$ that is lower than social democrats' optimum tax rate.

Next define $\hat{\tau}_C(\tau_S)$ as the conservative party's best response function to the social democratic tax rate τ_S, i.e.

$$\hat{\tau}_C(\tau_S) = \arg\max_{\tau_C} U^C(\tau_C, \tau_S) \tag{9}$$

and similarly for $\hat{\tau}_S(\tau_C)$. Both functions are depicted in figure 2. The slope of a party's reaction function depends on the cross-derivative of its utility functions with respect to both parties' dividend tax rates. This can be shown by implicitly differentiating the first order condition $U_1^C(\tau_C, \tau_S) = 0$ of maximization problem (9):

$$\frac{d\hat{\tau}_C(\tau_S)}{d\tau_S} = -\frac{\partial U_{12}^C}{\partial U_{11}^C}$$

Since $-U_{11}^C > 0$ by our earlier assumption, the sign of U_{12}^C determines the direction of change in party C's optimal tax rate in response to a change in party S's rate. By the same token, the sign of U_{12}^S governs the response of party S's dividend tax rate to changes in its rival's rate.

The signs of these derivatives depend on the specific underlying utility functions of the two parties. Here we assume that parties place a significant weight on investment and output under their rule. We can then find that $U_{12}^C > 0$ for $\tau_S > \tau_C$, i.e. the two parties' tax rates are *strategic complements* in the eyes of the conservative party – the marginal benefit to the conservatives of increasing the tax rate is increased when the social democrats increase their tax rate. This is because the larger the difference in tax rates between the two parties, the lower cash balances held by firms while conservatives are in power, and hence the lower investment will be, the lower employment and output will be, and the higher the marginal value of increasing taxes. It follows immediately that

$$\hat{\tau}_C(\tau_S) > \tau_C^* \quad \text{for} \quad \tau_S > \tau_C^*$$

The intuition behind this result is simple: Because the social democrats will set a tax rate τ_S higher than the conservatives' optimal rate τ_C^*, the conservatives will want to increase the tax rate which they levy when they are in power. Knowing that the tax rate will be higher in the next period (when the social democrats are in power), investors engage in intertemporal arbitrage and distribute more dividends now, lowering investment and output today. By raising the tax rate (closer to the rate levied by the social democrats), the incentive for firms to distribute dividends is reduced, and investment and output during the period in which the party is in power is increased.[13]

On the other hand, from the perspective of social democrats, when conservatives increase their tax rate, firms reduce cash balances under conservative rule by less and raise them by less under social democratic rule. This reduces the marginal benefit that social democrats receive from raising their tax rate. For the social democrats' utility function $U^S(\tau_S, \tau_C)$ we therefore find $U^S_{12} < 0$ for $\tau_S > \tau_C$ – for social democrats' utility the two parties' tax rates are *strategic substitutes*. Because the conservatives have lowered the tax rate below the optimal level τ_S^* of the social democrats, the latter benefit from increasing the tax rate, which raises investment and output under their rule. As a result we find that

$$\hat{\tau}_S(\tau_C) > \tau_S^* \quad \text{for} \quad \tau_C < \tau_S^*$$

More generally, we can express these results in the following proposition:

Proposition 1 *Suppose two parties have different preferences over the level of taxation (or other policy instruments) and implement two different rates.*

1. *If the two tax rates are* strategic complements *in a party's utility function and (a) the party is the one with preferences for a lower tax rate, it will increase its tax rate beyond the party's optimal level; (b) if the party is the one with preferences for a higher tax rate, it will decrease its tax rate below the party's optimal level.*

2. *If the two tax rates are* strategic substitutes *in a party's utility function and (a) the party is the one with preferences for a lower tax rate, it will decrease its tax rate below the party's optimal level; (b) if the party is the one with preferences for a higher tax rate, it will increase its tax rate beyond the party's optimal level.*

Point 1(a) applies to the conservative party and point 2(b) to the social democratic party. However, depending on the policy instrument in question and on parties' preferences over the underlying macroeconomic aggregates, all four cases outlined above are possible.

The Nash equilibrium $\mathcal{N}^*$ of the game is the pair of tax rates (τ_C^N, τ_S^N) that solves the equations

$$\hat{\tau}_C(\tau_S^N) = \tau_C^N \quad \text{and} \quad \hat{\tau}_S(\tau_C^N) = \tau_S^N$$

or, combining the two,

$$\hat{\tau}_C(\hat{\tau}_S(\tau_C^N)) = \tau_C^N$$

It is characterized by $\tau_C^N > \tau_C^*$ and $\tau_S^N > \tau_S^*$, i.e. the non-cooperative equilibrium entails for both parties a higher tax rate than the party would have supported on its own. This is clearly not Pareto efficient. Figure 2 depicts our analysis graphically.

[13] If the conservative party cares about the relative performance of the economy under its rule, then this provides a further argument for them for increasing the tax rate: for the lower the tax rate, the larger the "arbitrage," i.e. the higher the retained earnings of firms under social democratic rule, and hence the higher investment and output.

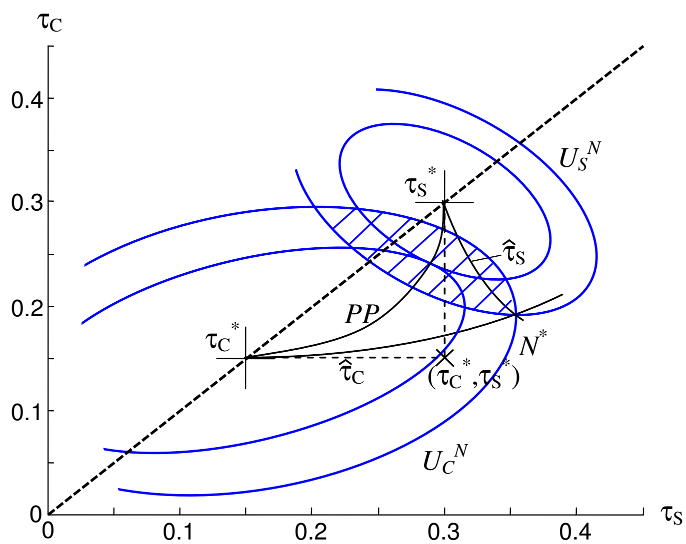

Figure 2: Parties' Iso-Utility Functions in the Nash Equilibrium: The graph depicts conservatives' and social democrats' dividend tax rates on the horizontal and vertical axis respectively. The preferred tax rates, in the given example $(\tau_C^*, \tau_S^*) = (15\%, 30\%)$ are indicated by crosses and are surrounded by concentric indifference curves, with parties' utility declining the further away they move from their optimum. In the Nash equilibrium, here at $(\tau_C, \tau_S) = (20\%, 35\%)$, parties' iso-utility curves U_C^N and U_S^N intersect in a right angle: no party can alter its tax rate individually without loosing utility. This point marks also the intersection of parties' reaction functions. On the other hand, if both parties cooperate to lower their tax rates, then they can both raise their utility: all pairs of tax rates inside of the shaded lens formed by the two iso-utility curves can be reached through a cooperative agreement.

Note that we have not made an assumption on the timing of party rule, i.e. on which party is in power first. The described setup works both for the case that one party is known to be the first mover and for the case that parties pick a tax rate *ex ante*, i.e. before they know which one will be in power first, such as on the eve of an election.[14]

5 Cooperative Equilibria

In the above analysis, each party chose a constant tax rate, taking the (constant) tax rate chosen by the other as given. Making policy depend on the previous history of tax policies opens up the possibility for a richer set of equilibria, in particular the possibility that parties can cooperate on how they set their tax rates.

We investigate next how parties can improve upon their welfare through cooperation. Both parties have a bias towards excessive taxation, since each party's choice of a dividend tax rate imposes an externality on the rival that induces the other party in turn to raise their tax rate. A cooperative agreement between the two can mitigate this bias.

While the described game allows for a very rich set of possible equilibrium outcomes, we focus again on pure strategy equilibria with a fixed dividend tax rate for each party. Among these equilibria, we will further describe the set of Pareto optimal equilibria.

Let us first determine the participation constraints for any such cooperative agreement. We define $\mathcal{C}^*$ as the set of all pairs of dividend tax rates $(\tau_C^{CO}, \tau_S^{CO})$ for which both parties' ex-ante utility is greater or equal than in the non-cooperative Nash equilibrium $\mathcal{N}^*$:

$$U^C(\tau_C^{CO}, \tau_S^{CO}) \geq U^C(\tau_C^N, \tau_S^N) \quad \text{and} \quad U^S(\tau_S^{CO}, \tau_C^{CO}) \geq U^S(\tau_S^N, \tau_C^N)$$

Figure 2 shows the Nash equilibrium $\mathcal{N}^*$ as well as the corresponding iso-utility curves U_N^i of the two parties, which indicate all tax pairs for which party i reaches the same utility as in the Nash equilibrium. The shaded lens between the two iso-utility curves depicts the set $\mathcal{C}^*$ of possible cooperative pairs of tax rates. Clearly, for each party a cooperative tax rate τ_i^{CO} must be lower than the corresponding tax in the non-cooperative Nash equilibrium $\mathcal{N}^*$, i.e. $\tau_i^{CO} < \tau_i^N$. This is because the negative externalities that parties impose on each other can only be reduced by lowering taxes from $\mathcal{N}^*$.

The set $\mathcal{C}^*$ does not include the point where each party plays its preferred tax rate (τ_C^*, τ_S^*) and the point where both parties play conservatives' preferred tax rate (τ_C^*, τ_C^*). However, depending on the parameters, it may include the point (τ_S^*, τ_S^*) – in figure 2 it does not. If some part of the diagonal $\tau_C = \tau_S$ is included in $\mathcal{C}^*$, then a cooperative agreement in which both parties keep a constant, identical dividend tax rate is feasible – in the given example in the figure this is the case. Based on the folk theorem we can derive the following result for all pairs of tax rates in $\mathcal{C}^*$:

[14] Naturally, the chosen tax rates could be different depending on this factor, though the differences would be limited by the fact that the long-run probability for any party to be in power is one half.

Proposition 2 *For each pair of taxes* $(\tau_C^{CO}, \tau_S^{CO}) \in \mathcal{C}^*$ *and for sufficiently low discount rates, the following strategy constitutes a cooperative equilibrium for* $i, j \in \{C, S\}$, $i \neq j$:

1. *Play* τ_i^{CO} *in the first period and as long as the rival does not deviate from* τ_j^{CO}.

2. *Play* τ_i^N *forever if the rival has ever deviated from* τ_j^{CO} *in the past.*

The utility of both parties in such an equilibrium is weakly higher than in the non-cooperative Nash equilibrium $\mathcal{N}^*$, and thus – given a high enough discount factor – they both have an incentive to agree upon one of the cooperative tax pairs in the set $\mathcal{C}^*$. A deviation from the agreement would return them to $\mathcal{N}^*$ forever after.

The upward-sloping $\mathcal{PP}$ line in figure 2 depicts the set of Pareto-optimal pairs of tax rates, i.e. of all pairs (τ_C, τ_S) such that no change in tax rates can improve on one party's utility without reducing its rival's utility. Along this locus, the iso-utility curves of both parties are tangents to each other. We denote this set as $\mathcal{PP}$. Analytically, it is defined as the locus of all pairs (τ_C, τ_S) such that

$$\frac{\partial U^C(\tau_C, \tau_S)}{\partial \tau_C} \cdot \frac{\partial U^S(\tau_S, \tau_C)}{\partial \tau_S} = 1$$

which implies that the indifference curves U_C and U_S are tangents. Note that only those Pareto-optimal pairs of tax rates that are also in set $\mathcal{C}^*$, i.e. all pairs $(\tau_C, \tau_S) \in \mathcal{C}^* \cap \mathcal{PP}$, can be sustained through cooperative agreements.

In order to determine which pair of tax rates will be picked in the political game between parties, additional assumptions are required. A common equilibrium concept for the described game between two parties is the Nash bargaining solution as discussed in Rubinstein (1982). To characterize the resulting equilibrium we define $\tau_C(q)$ and $\tau_S(q)$ as the dividend tax rates as we move along the $\mathcal{PP}$ locus in figure 2 from the conservatives' optimum τ_C^* to the social democrats' optimum τ_S^*. Let $q = 0$ denote the point τ_C^*, so that $\tau_C(0) = \tau_S(0) = \tau_C^*$, and similarly $q = 1$ denote the point τ_S^*. Observe that $\tau_H'(q) > 0$ and $\tau_L'(q) > 0$. The values $q = \underline{q}$ and $q = \overline{q}$ define parties' reservation values for a cooperative equilibrium, i.e. they are the intersections of $\mathcal{PP}$ with parties' Nash iso-utility curves U_C^N and U_S^N. These two points are also indicated in the figure. The pair of Pareto optimal tax rates $(\tau_C(q), \tau_S(q))$ is sustainable as a cooperative equilibrium in the sense of proposition 2 (i.e. for a low enough interest rate) if and only if $q \in [\underline{q}, \overline{q}]$.

Using this notation, parties' bargaining game can be described as negotiating on a $q \in [\underline{q}, \overline{q}]$. We assume that each period, the party in power i can make an offer q to its rival that defines a cooperative equilibrium with tax rates $\{\tau_i(q), \tau_j(q)\}$. If the other party accepts the offer, party i implements tax rate $\tau_i(q)$ immediately and in all future periods when it comes to power. Similarly, party j agrees to implement $\tau_j(q)$ whenever it comes to power. If the other party rejects the offer, party i implements its non-cooperative Nash tax rate of τ_i^N and another attempt to come to an agreement is made next period.

Following the concept of Rubinstein (1982), each party i's reservation value q_i in this game can be denoted as:

$$U^i(q_i) = \delta U^i(q_j) \quad \text{for} \quad i \in \{C, S\}$$

where δ is parties' discount rate and where we used $U^i(q_i) = U^i(\tau_C(q_i), \tau_S(q_i))$ to simplify notation. q_i as defined by this equation is the value of q that makes party i indifferent between accepting its rival's offer (the left-hand side) and waiting one period, with the chance of making a counter-offer q_j (the right-hand side). Thus, for any offer $q \geq q_i$, party i will accept the bargaining offer made by its rival. Similarly, party j's reservation value q_j can be expressed as

$$U^j(q_j) = \delta U^j(q_i) \quad \text{for} \quad i \in \{C, S\}$$

These two equations can be solved for q_i and q_j. The Nash bargaining equilibrium of the described game entails that the party i that is in power offers party j's reservation value q_j and party j accepts this offer. Consequently both parties follow the cooperative equilibrium described in proposition 2 with tax rates $\{\tau_i(q_j), \tau_j(q_j)\}$.

Note that this equilibrium is robust to unilateral requests for renegotiation: when party rule changes and the new party coming to power demands to renegotiate the existing agreement so as to take advantage of its newfound bargaining power, it is optimal for the previous party to decline this request. As long as the other party can credibly commit to punish any deviation from the earlier agreement by reverting to the Nash equilibrium, it is optimal for the new ruling party to comply.[15]

External enforcement mechanisms might help to better support a cooperative equilibrium. Examples would be a constitutional law that cannot be changed unilaterally at a later time, or a sufficiently high penalty for a party that deviates from an agreement. In a world in which explicit penalties for breaking the 'contract' cannot be imposed, similar results can be obtained through policies which have commitment-like effects, i.e. which impose a cost on the party deviating from the cooperative equilibrium. Constitutional amendments that prevent changes in tax rates are very costly, because they do not allow changes in response to changing circumstances. But a provision that e.g. delayed the implementation of any tax change (and which would have the change take effect only if the government in power then concurs) would reduce the benefits of, say, the Social Democrats from raising taxes above the cooperative level, because there is a high probability that they would no longer be in office when the change comes into effect.

6 Generalizations

We have modeled the political game between two parties that have different preferences over dividend tax rates, and for which economic performance under one party's rule

[15] If this commitment to punish deviations is not possible, then each party would renegotiate whenever it comes to power. If both parties anticipate this, the only sustainable equilibrium would be the Nash equilibrium.

is affected by the other party's choice of dividend tax rates. Our results, however, depend only on the properties of parties' reduced-form utility functions $U^i(P_i, P_j)$ for $i, j \in \{C, S\}$, which depend on the levels of the policy variable P taken by each of the two parties. Similar considerations hold in any situation, in which there is not full time-separability, i.e. the utility of say party i at time t does not depend just on the policy in place at that particular time. Such structures arise if:

1. Governments are contestable, i.e. the political parties in power and thus government policies change over time.

2. These policy changes create incentives for private economic agents to shift certain policy-relevant actions across time.

3. The change in private sector behavior affects macroeconomic variables, which in turn has an impact on parties' utility.

Other examples of such situations include:

- income taxes and reallocations in labor supply/compensation

- income taxes and payments into/withdrawals from tax-deferred IRAs, after-tax IRAs

- capital gains taxes and stock sales

- sales/VAT-taxes and purchases of durable consumer goods

- corporate profit taxes and a variety of corporate decisions, such as corporate investment, repatriations of foreign profits, executive compensation

- public infrastructure and complementary private investment

- environmental taxes/regulations and investment in green technologies

For each of these examples, there is empirical evidence that changes in policy have intertemporal effects that could lead to strategic "arbitrage." In general, the importance of these strategic effects of policies will be larger the higher private agents' ability (or the lower their cost) of shifting their actions across time. Furthermore, the strategic importance increases the larger the effect of the private sector's behavior on parties' utility.

It can also be shown that the introduction of new devices that allow the private sector to engage in intertemporal arbitrage, such as e.g. IRAs, benefits the utility of one party at the expense of the other party by affecting the nature of the strategic game between the two.

While all of these situations give rise to intertemporal interdependence, the critical cross-derivatives $\frac{\partial^2 U^i(\cdot)}{\partial P_i \partial P_j}$ may differ, with contrasting implications for the equilibrium values of policies. We leave a more general analysis of the political game between parties in such a situation to future work.

7 Conclusions

This paper analyzed the political game between two parties with different preferences regarding dividend taxation and the resulting macroeconomic consequences. We put at the center stage of our analysis the incentives for tax arbitrage that are created whenever firms expect tax changes: when conservatives are in power and taxes are low, firms expect that the next move of taxes will be upwards and so they have an incentive to pay out larger dividends now and reduce their working capital; conversely, under a social democrat regime with high dividend taxes, firms expect that dividend taxes will go down when party rule changes the next time, so they pay out less in dividends now and increase their working capital. In the presence of capital market imperfections, the level of firms' working capital is an important determinant of aggregate investment and output. Macroeconomic outcomes thus depend to an important extent on firms' expectations about future dividend taxation.

This has strategic implications on parties' choice of dividend tax rates: firms have a higher incentive to engage in tax arbitrage the larger the difference in tax rates between conservative and social democrat regimes. Conservatives can increase the level of working capital and aggregate investment under their regime by raising the level of dividend taxes, thereby reducing the gap to the social democrats and mitigating firms' incentives for arbitrage. Similarly, social democrats can also raise the level of firms' working capital and aggregate investment by raising taxes further, thereby magnifying the gap to conservatives' tax rate and increasing firms' incentive to arbitrage. As a result, both parties excessively raise taxes rates to an inefficiently high level, i.e. they both would be better off if they could come to a mutual agreement to lower tax rates.

While the structure of the problem analyzed here highlights the importance of intertemporal interactions in a very specific setting, they arise more generally. Our results suggest strongly that the analysis of behavioral responses to government policies, which assume that such changes are permanent, are seriously flawed when there are dynamic interactions.

In democratic societies with contestable elections, policies will vary with the party in office; no matter what assurances are given about changes being permanent, market agents rationally do not believe politicians' assurances. Furthermore, in a vibrant democracy policy changes are desirable. The analysis of the consequences for both behavioral responses of economic agents and for the political economy responses of political actors is a rich field to be explored in future research.

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