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INTERGENERATIONAL REDISTRIBUTION WITH SHORT-LIVED GOVERNMENTS

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ABSTRACT

We study the politics of intergenerational redistribution in an overlapping generations model with short-lived governments. The successive governments—who care about the welfare of the currently living generations and possibly about campaign contributions—are unable to pre-commit the future course of redistributive taxation. In a stationary politico-economic equilibrium, the tax rate in each period depends on the current value of the state variable and all expectations about future political outcomes are fulfilled. We find that there exist multiple stationary equilibria in many political settings. Steady-state welfare is often lower than it would be in the absence of redistributive politics.

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1 Introduction

Modern governments often use their fiscal authority to transfer income between different groups in society. While sometimes their goals are to further their societies' sense of distributive justice, more often the transfers serve the political ends of the elected representatives and the economic ends of certain of their constituents. Accordingly, the distribution of income has come to be seen as an outgrowth of the political process and its prevailing institutions.

Much research has been devoted to identifying characteristics of groups that make them good candidates for capturing redistributive benefits in a given political environment. For example, Lindbeck and Weibull (1987) and Dixit and Londregan (1994) study electoral competitions in which voters care about their particularistic benefits as well as certain immutable characteristics or positions of the candidates for office. In this setting, politicians who seek to maximize their votes target transfers to groups with relatively many members on the margin of indifference between the competing candidates and also to those who care relatively much about income as compared to the other issues to be settled in the election. Baron (1994) and Grossman and Helpman (1994, 1996) examine situations where organized special interest groups can contribute resources to candidates in order to promote their bids for favored treatment. The latter find that organized groups will succeed in capturing benefits at the expense of individuals and groups that do not make political contributions, and that the most successful groups will be the ones to whom income can be transferred with the least deadweight loss.

Most existing studies of redistributive politics are cast in the context of a static or "one-shot" political competition. Important new issues arise when the competition for political favors is revisited periodically or plays out over time. This is so for at least two reasons. First, the inability of an incumbent government to commit future governments to a particular course of action may limit its capacity to deliver benefits to targeted groups. The income transfers that a government undertakes may be undone by subsequent rulers, or even by its future self. Second, the redistributive policies that are implemented at a point in time may imply transfers to or from individuals who are not yet alive. Obviously, these individuals cannot participate in the political process either as voters or as members of special-interest groups.

These issues are critical to an understanding of the competition for particularistic benefits between members of different generations. Needless to say, such competition has become salient in modern politics. The elderly often cast their ballots with an eye toward protecting their social security, medical, and other benefits, and also to guard against confiscatory capital-income taxation, in view of their disproportionate holdings of non-human wealth. In many nations the older generation is well represented by an organized lobby, which undertakes additional political activities on behalf of its members. The young, for their part, may vote for candidates promising educational, childcare, and housing allowances, and for those who endorse low rates of taxation on earned income. And the young form a disproportionate share of the membership of labor unions, which are politically active to varying extents in different countries.

In this paper we study the politics of intergenerational redistribution. We construct a minimal overlapping-generations model in which agents make no meaningful *economic* decisions, in order to focus on their actions in the *political* realm. In our model, individuals work and save in the first period of their lives, and consume in the second. Depending on the political environment, they may help to finance a lobby group's political contributions in one or both periods. Meanwhile, taxes and subsidies on wage and capital income are set anew at the beginning of each period by politically-minded government agents. The politicians, we assume, have short time horizons. In particular, they care only about the well-being of generations alive at the time and possibly about the political contributions they can collect from the lobbies representing the interests of the two generations.[1] Although we take this political objective function from outside our model, it captures well the motivation of politicians who can serve for only a brief time, who value being in office above all else, and whose election prospects depend on the standard of living they deliver to the members of

[1]Politicians who care only about their near-term election prospects might nonetheless heed the welfare of unborn generations if voters had concern for the well-being of their offspring. We shall assume here that each generation is completely selfish, in order to sharpen the focus on intergenerational conflict.

the voting population and perhaps on their campaign spending.

Three main features distinguish our analysis from previous research on related topics.[2] First, most of the literature adopts a median-voter approach to policy setting. For example. Browning (1975), Sjoblom (1985), Azariadis and Galasso (1995), and others have studied public pension schemes that result from direct democracy. Tabellini (1991) has applied majority rule to the question of whether a polity will choose to honor the public debt incurred by its predecessors. And Persson and Tabellini (1994), Alesina and Rodrik (1994) and Krusell and Ríos-Rull (1993) have examined how (redistributive) capital income taxation affects accumulation and growth when tax rates are chosen to maximize the welfare of the median voter. In our view, the median-voter model, useful as it may be, misses important aspects of the political process in representative democracies. In particular, it neglects the fact that some groups often are favored by the political process relative to others, and that coalitions of voters often take further political actions beyond voting in order to influence policy. While we do not present in this paper a full-fledged alternative to the median-voter model, we do use a flexible government objective function that might apply to a wider range of political settings.[3]

Second, some authors—especially the earlier ones—allowed for far-sighted governments and policy commitment. For example, Browning (1974) and Boadway and Wildason (1989) assume that voters cast their ballots under the belief that whatever policies they decide will remain in effect forever. In contrast, we require the time sequence of government policies to be dynamically consistent in a setting where each government can fix tax rates for only one period. This approach is similar, of course, to much recent work on dynamic fiscal policy with welfare-maximizing government. Kydland and Prescott (1977) were the first to point out that a government's inability

[2]The literature on the politics of intergenerational redistribution is nicely surveyed by Breyer (1994).

[3]We note that Verbon and Verhoeven (1992) use a government objective function similar to the one that we employ in Section 3, in their study of intergenerational transfers. They, however, do not allow for campaign contributions and interest-group politics, as we do in Sections 4 and 5, and their definition of dynamic equilibrium is more restrictive than ours, as we discuss below.

to pre-commit future policies could have an important bearing on its current decision. They and others (e.g., Fischer, 1980, and Chari and Kehoe, 1990) have shown how the "optimal tax plan" might be time-inconsistent; i.e., it might call for policies in the future that would no longer seem optimal once the time came for their enactment. A time-consistent policy path is one along which each policy is optimal when the government and private agents expect subsequent governments to set policies that are optimal from their vantage points as well. This notion has been carried over to policies determined by majority vote, in the work of Sjoblom (1985) on public pensions and Krusell and Ríos-Rull (1993) on capital income taxation.

Third, we allow (and only allow) agents to condition their political actions on the state of the economy at the time. Moreover, we assume that agents expect future policies to depend on the state of the economy that will prevail when those later decisions are to be taken. Our approach contrasts with that of Verbon and Verhoeven (1992), who assumed that policy makers ignore the effect that their chosen transfer scheme has on the political environment in the future. It also contrasts with Sjoblom (1985) and Azariadis and Galasso (1995), who allow voters to condition their votes on the history of policy actions taken in the past. We used adopt the Markov-perfect-equilibrium concept, as proposed in a similar context by Krusell, Quadrini and Ríos-Rull (1994). An equilibrium here is a fixed point in the mapping from expectations about future policies, seen as functions of the then prevailing state of the polity, to the current policy choice, which depends on the current state of the political-economic system.

The remainder of our paper is organized as follows. The next section sketches a simple model economy. We also describe the (trivial) *laissez-faire* equilibrium, which serves as a benchmark for later comparisons. In Section 3 we introduce a sequence of short-lived governments, each of which seeks to maximize a weighted sum of the expected lifetime utilities of the two generations of its constituents. The governments can levy taxes on capital or labor income and use the proceeds to finance subsidies. We show that such a polity has multiple equilibria. If governments expect that successors will tax capital heavily and subsidize labor, they are willing to follow suit. On the other hand, if they expect succeeding governments to tax wages and subsidize capital, again they are willing to do likewise. Consumption in the steady state depends upon the (free) parameter representing expectations, as well as on the relative weight the government places on the well being of the young and on the productivity of capital. One particularly interesting finding is that the politics may sustain long-run growth, even though the economy is stagnant in the long run in the absence of fiscal policy. Growth occurs when successive governments place a large weight on political support from the young.

In Section 4 we introduce special-interest groups. These are Olsonian coalitions (see Olson 1965) of the members of a single that undertake collective political action. In reality, such pressure groups undertake various activities in pursuit of particularistic benefits. Here we focus on just one such activity, namely the offering of campaign contributions. First we investigate a political equilibrium in which successive generations of old join lobbies, while the young are always politically unorganized. We find that the unique policy outcome is a permanent subsidy to capital that transfers all current income to the old. However, the old may not get to consume all of this output, for some of it may be paid to the politicians. In a worst case where the politicians attach a very large relative weight to political support from the young, the entirety of national output goes either to financing political campaigns or to investments that will generate output with a similar end use.

The latter part of Section 4 examines a polity in which only the successive generations of young are organized as pressure groups. The equilibria that arise in this case are not fully symmetric to those that arise when only the old lobby, because the young (unlike the old) cannot ensure their own felicity by striking a deal with the extant politicians. The young recognize that transfer policies undertaken by the current government for their benefit might well be undone by a later government heeding the pressure exerted by the succeeding generation of young. Once again there are multiple equilibria that hinge on expectations.

In Section 5 we allow for simultaneous contributions from competing generational interest groups. We show that the competition for political favors, like price competition in oligopoly situations, can be especially fierce. In a truthful equilibrium (where both lobbies tailor their offers to reflect their underlying preferences), the groups bid all of their after-tax income to curry politicians' favors, and all of national output is consumed by the political process.

Section 6 contains some concluding remarks.

2 The Economy

We make the model economy as simple as possible in order to focus attention on the pure politics of intergenerational redistribution. The economy is populated by overlapping generations of identical individuals. Each individual lives for exactly two periods. When young, an individual supplies one unit of labor inelastically. When old, the individual does no work, but earns rental income from any capital she may have accumulated. The inputs of labor and capital are used to manufacture a homogeneous final good according to the time-invariant, linear production function,

$$Y_t = L_t + RK_t, \quad R \geq 1, \tag{1}$$

where Y_t is output, K_t the capital stock, and L_t the labor force, all at time t. A unit of capital can be produced from one unit of (last period's) final output and depreciates completely in one period. The population is constant and its size is normalized so that $L_t = 1$.

The young do not consume. Depending on the political environment, they may or may not contribute part of their wage income to a lobby group that looks after their collective interest. The remainder of their income goes to taxes (possibly negative) and savings. The old, too, might participate in collective action, depending upon the political setting. The old derive no utility from bequests. Whatever they earn as capital income or receive in transfers that is not contributed to a lobby or paid in taxes, they consume. C_t denotes aggregate consumption by the old in period t.

Notice that there are no economic interactions between the generations and no economic decisions. The young face no labor-leisure trade-off and make no first-period consumption choices. Their marginal and average labor productivity is constant and independent of the actions of others. The old have no bequest motive and consume whatever they can. The marginal and average productivity of their capital also is constant and independent of any equilibrium outcomes. In spite of the simplicity of this economic setting, we will discover a rich set of political outcomes.

As a benchmark against which to compare these outcomes, we outline the competitive equilibrium in the absence of redistributive politics. Suppose there is no government or one that lacks the authority to levy taxes. Then a young individual keeps the entirety of her wage income, which she uses to purchase one unit of the final good. This she rents out as capital in the second period of her life. The capital earns a gross return of R, which the individual uses to buy consumption goods. Evidently, the economy converges to a steady state in at most one period. In the steady state, $K_t = 1$, $Y_t = 1 + R$, and $C_t = R$. Despite the linear technology that makes sustained growth possible, the economy experiences no growth.

3 The Politics

In this section we introduce a government that has the authority to transfer income between the generations. We envision a government of politically-motivated but short-lived representatives, whose objective it is to maximize support among the currently living voters. The government cannot bind subsequent rulers to policies that will take effect in future periods. Because it is politically motivated and short-lived, it does not care about the well-being of unborn generations, except to the extent that its current constituents have such an altruistic concern. We have intentionally made each generation completely selfish, in order to focus on the implications of having politicians with short time horizons.

We endow each government with a simple objective function. The representatives seek to maximize a weighted sum of the (expected) lifetime utilities of potential voters. The utility of the old generation is measured by current-period consumption; that of the young, by their expected consumption in the next period. So $G_t = \theta C_t + C^e_{t+1}$, where G_t is the assumed objective function for the government in power at time t, C^e_{t+1} is the expected old-age consumption by the young of period t, and θ is the relative weight the politicians attach to the well-being of the old.[4] Since we study only trajectories with self-fulfilling expectations, we henceforth use C_{t+1} in place of C^e_{t+1}.

This type of government objective function—which is familiar from the political-support approach to the theory of regulation (see, for example, Stigler 1971 and Pelzman 1976)—can be motivated in several ways. For example, Lindbeck and Weibull (1987) and Dixit and Londregan (1994) have examined probabilistic voting models in which two parties vie for political office. Voters fall into one of several groups, any of which can be targeted for income transfers. In each group, the voters have a distribution of ex ante evaluations of the parties' ideological positions or immutable characteristics. A voter casts her ballot for whichever party offers the highest utility, taking into account both her ex ante preferences and the proposed transfer policies of the two sets of candidates. The authors show that, in this setting, the parties choose their (identical) platforms to maximize a weighted sum of the groups' utilities. The weights reflect the fraction of voters in each group who are "political moderates;" that is, indifferent between the two parties when their proposed transfers are the same. If all groups are identical in their partisan affinities but differ instead in their propensities to vote, then government policy favors the groups whose members are most likely to visit the polls.

There are various instruments that the government might use to transfer income across the generations. Since government policies cannot distort economic decisions in our simple model economy, many of these will be equivalent here. For concreteness, we consider a subsidy to (or tax on) capital income, which leaves the after-tax return on a unit of capital equal to $\tau_t R$. This policy requires (or raises) revenue of $(\tau_t - 1)RK_t$. The government collects (or redistributes) this revenue by taxing (or subsidizing)

[4]The parameter θ captures also any adjustment for time preference. That is, the period t young will not consume until period $t+1$. To the extent that individuals discount future utility, the government will weight the consumption of the young and the old differently, even if it views the two generations as symmetric potential contributors of political support.

the wages of the young.[5] Since the total wage income of the young equals 1, the government is constrained to set $\tau_t \leq 1 + (RK_t)^{-1}$. Of course, $\tau_t \geq 0$, because the government can capture at most 100% of the capital income of the old. A policy of τ_t equal to 1 entails no intergenerational redistribution and corresponds to a situation of *laissez faire.*

In choosing its fiscal policy, the government at time t must look ahead to period $t + 1$. This is because its young constituents will consume then and their disposable income will be affected by the policies introduced at that time. Thus, each government must forecast future political outcomes. If we do not constrain these forecasts in any way, there will be many policy trajectories that are self-fulfilling. To limit the set of potential equilibria, we restrict attention to expectations that meet a requirement suggested by Krusell, Quadrini, and Ríos-Rull (1994). They argued that, in a stationary environment, the policy expected for period t ought to depend only on the values of the state variables expected at that time. In other words, a government that will be in power at time t_1 when the capital stock will be K_1 will face a similar problem to another that will be in power at time t_2, if K_2 happens to equal K_1. It may be reasonable, then, to anticipate that these two governments will behave similarly. In the event, the political equilibrium will be characterized by a *stationary tax policy function,* relating the tax policy in any period to the capital stock at that time.

We now formulate the problem facing a government in power at time t. If it sets a capital income tax rate of τ_t, then the old generation alive at t consumes $\tau_t RK_t$. The young generation is left with disposable income of $1 - (\tau_t - 1)RK_t$, which it uses to purchase capital goods. In period $t + 1$, these capital goods will earn an expected after-tax return of $\tau(K_{t+1})R$ per unit, in view of the tax rate $\tau(K_{t+1})$ that is anticipated for that period. Thus, the government at time t solves the following problem:

[5] Because the government cannot commit future governments to follow any course of fiscal policy, we exclude its issuance of public debt. For analyses of government debt and the role it may play in the politics of intergenerational redistribution, see Cukierman and Meltzer (1989) and Tabellini (1991).

$$\max_{\tau_t, K_{t+1}} \quad \theta \tau_t R K_t + \tau(K_{t+1}) R K_{t+1} \quad . \tag{2}$$

$$\text{subject to} \quad \text{(i) } 0 \leq \tau_t \leq 1 + \frac{1}{RK_t} \quad \text{and} \quad \text{(ii) } K_{t+1} = 1 - (\tau_t - 1)\, RK_t \, .$$

The solution to this problem gives the government's politically optimal tax rate, τ_t, as a function of the capital stock K_t that its old constituents inherit from the past. We express this functional relationship as $\tau_t = \tilde{\tau}(K_t)$.[6]

A *stationary equilibrium* arises when the expected stationary tax function is self-fulfilling. That is, the government at time t, with expectations $\tau(K_{t+1})$ about the period $t+1$ tax rate, finds it optimal to set the tax $\tilde{\tau}(K_t)$. The government's expectations about the future are consistent with the incentives that will actually face the future government if and only if $\tau(\cdot) \equiv \tilde{\tau}(\cdot)$. More formally, we propose the following definition.

Definition 1 *A stationary equilibrium is a fixed point in the mapping from $\tau(\cdot)$ to $\tilde{\tau}(\cdot)$, where $\tau(K_{t+1})$ is the expected stationary tax function and $\tilde{\tau}(K_t)$ is a solution to problem (2), given the initial capital stock K_t.*

Our goal in the remainder of this section is to characterize these equilibria.[7]

3.1 Stationary equilibria

The solution to the government's problem satisfies the Kuhn-Tucker conditions. Let's substitute the constraint (ii) into the maximand (2) and define the function

$$f(K_{t+1}) \equiv \theta - R[\tau(K_{t+1}) + \tau'(K_{t+1})K_{t+1}] \ ,$$

[6]The tax rate that maximizes (2) need not be unique. If it is not, then the government might choose any element in the set of politically optimal tax rates.

[7]We note that the model in this section has an identical mathematical structure to some simple formulations of a "bequest game." Suppose that the old generation in period t cares about its own consumption and the next period's consumption of its offspring. The old generation, with capital K_t, chooses a bequest B_t to maximize $U(C_t) + \delta U(C_{t+1})$, subject to $C_t = K_t - B_t$ and $K_{t+1} = f(B_t)$. Then the Markov-perfect equilibria (MPE) are similar to the ones we describe here. Leininger (1986) and Bernheim and Ray (1989) have studied the existence of MPE for this class of games, while Fudenberg and Tirole (1992, pp.507-509) derive one MPE for a parametric example.

which is the derivative of the resulting expression, divided by RK_t. Then the Kuhn-Tucker conditions imply

(i) $\tau_t = 0$ whenever $f(1 + RK_t) \leq 0$;

(ii) $\tau_t = \hat{\tau}$, where $\hat{\tau}$ satisfies $f[1 - (\hat{\tau} - 1)RK_t] = 0$, whenever $0 \leq \hat{\tau} \leq 1 + (RK_t)^{-1}$; and

(iii) $\tau_t = 1 + (RK_t)^{-1}$ whenever $f(0) \geq 0$.

The stationary equilibria can now be identified.

3.1.1 Small weight on the welfare of the old

Consider first the case where the gross return on capital exceeds the government's relative preference for the old; i.e., $\theta < R$. Then each government is tempted to transfer income to the young, because the young can invest the proceeds and earn a higher return than the weight the government attaches to consumption by the old. But each government is wary of such a policy, for it knows that subsequent governments will face a similar temptation. In particular, no stationary equilibrium can have all income transferred to the young, for if $\tau(K_{t+1}) \equiv 0$, then the government at time t would opt instead to let its old constituents consume the national output. In this situation, the (stationary) equilibrium tax rate is bounded away from both extremes.[8] Therefore, the condition $f = 0$ must be met at all t. But $f = 0$ for all t if and only if the tax function obeys the differential equation $\tau(K) + \tau'(K)K = \theta/R$. Solutions to this differential equation will be candidate equilibrium tax functions.

The differential equation has the general solution

$$\tau(K) = \frac{\theta}{R} + \frac{A}{K} \tag{3}$$

[8]The tax function $\tau(K_{t+1}) = 1 + (RK_{t+1})^{-1}$ also cannot form part of a stationary equilibrium, because if the government at time t held these expectations, it would choose to set its own tax rate equal to zero.

for arbitrary values of the parameter A. Suppose, then, that the government at time t were to anticipate such a policy response from the government-to-be at time $t+1$. Then a marginal increase in τ_t would have no effect on its political support index, G_t. The political gains it would enjoy by improving the lot of the old would just offset the losses it would suffer from harming the young. The government at t would find itself indifferent between all feasible tax rates, and so would be willing to choose the rate that obeys the same formula. All that remains is to check that tax functions with the form of (3) are feasible along the economy's presumed equilibrium path.

To this end, consider the evolution of the capital stock. Given the intergenerational redistribution implied by (3), it evolves according to

$$K_{t+1} = 1 - AR + (R - \theta)K_t. \tag{4}$$

Figure 1 depicts these dynamics for a given value of $A < 1/R$, assuming $R - 1 < \theta < R$. The curve KK represents equation (4). For $R < 1 + \theta$, this curve is less steep than the 45 degree line. Evidently, the capital stock remains positive no matter what its initial size, and the economy converges monotonically to a steady state with $\bar{K} = (1 - AR)/(1 + \theta - R)$.[9]

Two comments are in order. First, there are multiple stationary equilibria indexed by the free parameter A. Each government is indifferent among tax rates, given the expected behavior of its successor. Thus no government has any reason to lower its rate, even though it would prefer *ceterus paribus* to see the young have more funds to invest. If $A = 0$, the capital tax is constant at a rate $\tau_t = \theta/R < 1$. In this case, each government transfers income from the old to the young. On the other hand, if A is close to $1/R$, then $\tau_t > 1$, at least in the steady state. In this case, each government, after perhaps some initial ones, transfers income from the young to the old.

Second, the political outcome affects the long-run equilibrium of the economy.

[9] We need also that τ_t remains positive at all times. From the tax function, $\tau_t > 0$ if and only if $A > -\theta K_t/R$. From the figure we see that the minimum size of the capital stock is either its initial value K_0 or its long-run value $\bar{K}$. It follows that the tax rate will remain positive if and only if $\theta/R(R-1) > A > -\theta K_0/R$. Note that the first inequality always is satisfied when $A < 1/R$ and $R < 1 + \theta$.

The greater is the free parameter A, the smaller is the steady-state capital stock and the smaller is steady-state consumption. If, for example, $A = 0$, then steady-state consumption is $\bar{C} = \theta/(1 + \theta - R)$, which exceeds the steady-state consumption of R that takes place in the absence of any redistribution. On the other hand, as $A \to 1/R$, then $\bar{C} \to 1$, which is less than consumption in the steady state without redistribution.

Maintaining the assumption that $\theta < R$, Figure 2 depicts the dynamics for the case when $\theta < R - 1$. In this case, the KK line has a slope greater than one. Both K_t and τ_t remain positive provided that $-\theta K_0/R < A < 1/R$. In the event, the capital stock and aggregate consumption both grow without bound. In the long run, the growth rates of capital and consumption converge to $R - 1 - \theta$, which is independent of the parameter A.

Here, the politics alone sustain economic growth. Each new government caters to its young, knowing full well that its successor will undo some of what it has accomplished. In the long run, the successive governments transfer a constant fraction $1 - \theta/R$ of capital income to the young. Since income grows, so do the wage subsidies, savings, and the capital stock.

3.1.2 Large weight on the welfare of the old

Perhaps more realistic in modern democracies is the case where politicians attach a large weight to the welfare of the old . This may be for reasons discussed by Dixit and Londregan (1994): Perhaps the old care less than the young about ideological issues and so stand more ready to compromise their partisan loyalties in return for particularistic benefits. In any event, we now take up the case in which the government's weight on the utility of the old exceeds the gross return to capital.

When $\theta > R$, there always exists a stationary equilibrium in which successive governments tax away all wage income from the young and use the proceeds to subsidize the capital earnings of the old. To see that this is so, suppose that the government at time t expected its successor to behave in this manner; i.e., it expects $\tau(K_{t+1}) = 1 + (RK_{t+1})^{-1}$. Then $f(0) = \theta - R > 0$, and the government at time t is happy to follow suit. Unfortunately, this equilibrium is not a very good one, as far as steady-state welfare is concerned. The initial old generation consumes $1+RK_0$, which is more than it would have consumed in the absence of redistributive politics. But the capital stock converges immediately to zero and subsequent generations consume only $\bar{C} = 1$. The politics harm every generation born after the government gains its ability to tax.

However, this extreme equilibrium is not the only one that can arise in these circumstances. There are also stationary equilibria like the ones we have seen before, with tax rates that leave both generations with some disposable income. We consider again a stationary tax function with the general form given in (3). We know that when this function describes expectations about the future, each government is indifferent among the alternative values for τ_t. The tax function can be self-fulfilling, provided the tax rate and capital stock remain non-negative.

Figure 3 depicts the evolution of the capital stock, for the case in which $1 + R > \theta > R$. This time, the KK curve is downward sloping, with a slope greater than -1. If $A < 1/R$, the curve passes through the positive quadrant. Moreover, if $A < 1/R - (\theta - R)K_0/R$, the initial point on the KK line lies in the interior of this quadrant, which means that K_1 will be positive. Then the capital stock follows a path of damped oscillations (see the figure), converging ultimately to $\bar{K} = (1 - AR)/(1 + \theta - R)$. We need only to check that the tax rates τ_t remain positive along this path. Given the tax formula in (3) and the oscillations in K_t, it is clear that τ_0 and τ_1 are the extreme values for τ_t along the path. There always exists a range of values for A that ensure positive values for both of these tax rates.[10] We conclude that a continuum of equilibria exists for any initial capital stock K_0. These equilibria are characterized by oscillating tax rates, oscillating capital stocks, and convergence to a stationary state in the long run.

[10]For $\tau_0 > 0$, we need $AR > -\theta K_0$. For $\tau_1 > 0$, we need $AR < (1 + RK_0 - \theta K_0)\theta/(\theta - 1)$. Since the right-hand side of this last inequality exceeds $-\theta K_0$, values of A can always be found to satisfy these two requirements. Moreover, since $-\theta K_0 < 1 - (\theta - R)K_0$, there are values of A that make both τ_0 and K_1 positive. This establishes the existence of stationary equilibrium tax functions as in (3), for some measurable set of parameters A.

Now suppose that $\theta > 1+R$. The dynamics for this case—in which the government derives much greater political support per unit of consumption from the old than the young—are illustrated in Figure 4. Since the slope of the KK line is less than -1, all trajectories are unstable. It follows that there are no stationary tax functions of the form $\tau(K) = A/K + \theta/R$ that yield non-negative values for τ_t and K_t all along the associated path. However, there do exist stationary equilibria of a similar sort. Consider the tax function

$$\tau(K) = \min\left(\frac{A}{K} + \frac{\theta}{R}, 1 + \frac{1}{RK}\right). \tag{3'}$$

This function calls for the tax rate of $A/K + \theta/R$ whenever that rate is feasible, and for the maximum feasible rate of $1 + (RK)^{-1}$ otherwise. The capital stock evolves according to (4) when the former is true, while the capital stock is zero following any period in which the latter is true. Notice that if the capital stock hits zero in any period s, the taxes collected from the young in that period total $\tau_s RK_s = AR$. Then the capital stock in period $s+1$ is $1-AR$, which brings forth a tax rate in period $s+1$ of $1 + (RK)^{-1}$ and thus a capital stock in period $s+2$ of zero again. With the tax function in (3′) and an appropriate choice of A, the polity converges to an oscillating steady state (or "limit cycle"), with a capital stock of zero and consumption of AR in alternate periods, and a capital stock of $1-AR$ and consumption of $1+R(1-AR)$ in the others. Consumption in periods following a maximal capital subsidy is certainly less than what it would have been in a long-run equilibrium without redistribution, whereas consumption in the periods with such a subsidy may be higher or lower than R, depending on the value of A.

3.2 Recap

We pause to summarize some of the main findings up to this point. A government that uses its fiscal authority to maximize its short-run political support can have dramatic effects on the course of capital accumulation and (steady-state) welfare. We have examined a government that weighs the utility of currently-living generations, but that ignores its impact on generations as yet unborn. Two key structural parameters influence its behavior: the return on investment and the relative weight the government attaches for political reasons to the well-being of the old generation, as compared to the young. Expectations about the behavior of subsequent rulers—whose hands it cannot tie—also figure prominently in the political equilibrium.

One key finding is the existence of multiple equilibria. When a government expects future governments to tax the old heavily, it is willing to do so itself. Even if it values the political support of the old generation highly, it knows that the disposable income it leaves to its young will earn a high after-tax rate of return, in view of the effect the extra savings will have on the equilibrium political outcome in the succeeding period.[11] When the economy converges to a steady state, the long-run consumption of each generation will be higher the more heavily each government expects its successors to favor their young.

Another finding is that the politics of intergenerational redistribution can generate growth where none would occur in its absence. In our model this happens when the relative weight the government attaches to the welfare of the young is quite large ($\theta < R - 1$). Then each government taxes its old and makes transfers that add to the accumulation of its young. The subsidy rate goes to a constant, which means that the subsidy amount becomes larger as income grows. The long-run growth rate of the economy is independent of political expectations in this case, although the transition path is not.

No matter how large the government's relative bias in favor of the young, it never appropriates all of the capital income of the old in a stationary political equilibrium. This contrasts with the behavior of an infinitely-lived and benevolent ruler, who is tempted to expropriate the returns from sunk investments in a time-consistent

[11] When a government at time t takes a dollar from the old, it loses political support from that group worth θ. But if it expects the next government to tax capital according to the function $\tau_{t+1} = A/K_{t+1} + \theta/R$, then it expects its young to be left with after-tax income of $AR + \theta K_{t+1}$ in period $t+1$. Therefore, the dollar it leaves to the young generates additional consumption for them of θ, and additional political support of the same amount.

equilibrium.[12] Here the government is assumed short-lived, and if it anticipates that future governments will tax all of the returns to capital there is no reason for it to leave anything for its young to invest.

In contrast, when the political environment is such that each government favors its old constituents, the polity may get trapped in a bad equilibrium in which permanently large transfers to the old preclude capital investment by the young. In such an equilibrium every generation after the initial old does worse than it would in the absence of political redistribution. But the equilibrium will be self-fulfilling unless governments can find a way to constrain their successors.

4 Special-Interest Politics

Redistributive politics often turn on more than just the characteristics of voters in the groups involved. Besides expressing their preferences at the polls, individuals with a similar stake in policy often band together into coalitions to pursue their collective interest in other ways. These coalitions—which we refer to broadly as "lobbies"—engage in a variety of political activities, including the dissemination of information, efforts to persuade voters and elected representatives of the justness of their cause, and the like. In addition they often make financial contributions to politicians and parties, which the latter use to finance their election campaigns. This trading of money for influence is, we feel, an important part of the political process that determines the distribution of political spoils in many modern democracies.

In the remainder of this paper we examine how campaign giving by special-interest lobbies can alter the political landscape in intergenerational politics. The potential interest groups in this case are, of course, the young and the old. The young comprise a disproportionate share of the membership of labor unions, so this is one lobby that might be expected to champion their cause. The young sometimes organize on other issues, such as housing or education policy. Meanwhile the old are well represented

[12]The temptation, however, comes from considerations of efficiency, which are absent from our model economy. See, for example, Kydland and Prescott (1977).

in many countries by an active geriatric lobby. And to the extent that the old own a disproportionate share of the capital stock (as we assume in our model), they are also represented by pro-business groups. We have little to say about which group is more likely to organize into an effective lobby in different political settings. Instead, we take the existence or not of lobbies representing the generations as a given and explore the implications of their influence-seeking activities. In this section we consider the political outcome when one group alone lobbies for favorable treatment; political competition between two contributing pressure groups is taken up in the next section.

4.1 Political contributions and government objectives

We maintain the earlier assumptions of our economic model. But now we allow an organized lobby or lobbies to offer political contributions to politicians in exchange for their policy support. More specifically, the organized lobbies confront the politicians with *contribution schedules.* These schedules stipulate a level of donation corresponding to every value of τ_t that the government might endorse. Of course, an explicit offer to trade money for influence would be frowned upon in most societies. Still, an implicit understanding can often be reached whereby politicians come to recognize that lobbies support their "friends."

How do the politicians evaluate these offers? On the one hand, the gifts can be used to finance campaign spending, which presumably means additional votes. On the other hand, the particularistic benefits that a donor expects in exchange for its contribution may cost the politicians support among the disfavored group. We need a government objective function that incorporates both of these considerations. Following the approach we have taken elsewhere (see Grossman and Helpman 1994), we suppose that each short-lived government maximizes a political support index that includes the utility levels of the two groups of potential voters and the total amount of contributions as arguments.[13] For simplicity, we take this function to be linear.

[13]This reduced form can be derived from a model of electoral competition, in which two parties contest seats in a legislature, "informed voters" vote based on the policy platforms and ideological positions of the parties, and "uninformed voters" respond to campaign advertising; see Grossman

Specifically, the government at time t seeks to maximize

$$G_t = \theta C_t + C_{t+1} + bZ_t, \tag{5}$$

where Z_t denotes the total amount of political gifts collected from all contributing lobbies and b represents the weight that the government attaches to a dollar of contribution relative to a dollar of additional consumption by the young. We assume $b > \theta$, which means that the politicians prefer a dollar in their own coffers to a dollar in the hands of the old. Without this assumption, the politicians would never accept gifts from the old.

4.2 Contributions by a lobby representing the old

We suppose first that every old generation manages to form an active lobby group, but that successive generations of young fail to do so. The lobby at time t designs a contribution schedule to maximize consumption by the old, knowing that the government will set taxes to serve its own political interest. The lobby finances its activities with a membership fee. It might, for example, make its fee proportional to individuals' capital holdings, which would ensure that all members share in any benefits generated by the lobbying effort.

Suppose the lobby confronts the government with the contribution schedule $Z_t(\tau_t)$. To evaluate its political support index, the government must gauge the likely future consumption of its young constituents. A stationary tax function links the expected tax rate for period $t+1$ to the size of the capital stock at the time. Similarly, a stationary contribution function gives the expected future contribution by the current young as a function of the capital they will hold when old. We let $Z_o(K_{t+1})$ represent the political contribution expected for period $t+1$ and $\tau_o(K_{t+1})$ represent one plus the expected rate of capital subsidization.[14] Then we define $r_o(K_{t+1}) \equiv \tau_o(K_{t+1})R - Z_o(K_{t+1})/K_{t+1}$ as the expected net return on a unit of savings, considering both the

and Helpman (1996).

[14]The subscript "o" in the remainder of this subsection refers to an equilibrium in which only the old generation lobbies.

expected capital tax or subsidy and the expected future lobbying costs. With this definition, the period-t government expects its young to consume $r_o(K_{t+1})K_{t+1}$ in period $t+1$, assuming they save K_{t+1} in period t.

The government's problem, which is analogous to (2) above, can now be formulated as follows:

$$\max_{\tau_t, K_{t+1}} \ \theta[\tau_t R K_t - Z_t(\tau_t)] + \ r_o(K_{t+1})K_{t+1} + bZ_t(\tau_t) \ , \tag{6}$$

$$\text{subject to} \ \ \text{(i)} \ 0 \leq \tau_t \leq 1 + \frac{1}{RK_t} \ \ \text{and} \ \ \text{(ii)} \ K_{t+1} = 1 - (\tau_t - 1)\, RK_t \ .$$

The three terms in the maximand represent a measure of the political support generated among the old voters (equal to θ times their consumption), the support generated among the young (equal to their expected consumption), and the political worth of the campaign contributions, respectively. The government faces the same two constraints as before.

Now consider the problem facing the lobby. The lobby recognizes that it can induce the government to endorse any policy it wishes, provided it pays the right "price". Suppose, for example, it wishes to see the government choose the policy $\tilde{\tau}_t$. In the absence of any contributions, the government would instead choose the tax to maximize $\theta\tau_t RK_t + r_o(K_{t+1})K_{t+1}$ and thereby achieve political support equal to, say, $G_o^*(K_t)$. All the lobby needs to do is assign a contribution to $\tilde{\tau}_t$ that leaves the politicians with at least this reservation level of welfare, while ensuring that no other policy choice offers them still more support. The minimum contribution that induces the policy $\tilde{\tau}_t$ leaves the government just indifferent between accepting and rejecting the lobby's offer, and is given by $[G_o^*(K_t) - \theta\tilde{\tau}_t RK_t - r_o(K_{t+1})K_{t+1}]/(b-\theta)$.

The lobby's problem thus can be viewed as one of choosing τ_{ot} to maximize $\tau_{ot}RK_t - Z_{ot}$, subject to $Z_{ot} = [G_o^*(K_t) - \theta\tau_{ot}RK_t - r_o(K_{t+1})K_{t+1}]/(b-\theta)$, $K_{t+1} = 1 - (\tau_{ot} - 1)RK_t$, and $0 \leq \tau_{ot} \leq 1 + (RK_t)^{-1}$. The solution to this problem gives the tax rate $\tilde{\tau}_o(K_t)$ and the associated political contribution $\tilde{Z}_o(K_t)$, as functions of the size of the capital stock.[15]

[15]Once the lobby has identified its preferred policy, there are many contribution schedules it

The lobby's policy choice and contribution level depend on its expectations about the future. These expectations are summarized in the pair of functions $\tau_o(\cdot)$ and $Z_o(\cdot)$. Once again we require the expectations to be self-fulfilling, which motivates the following definition of a stationary equilibrium.

Definition 2 *A stationary equilibrium in the polity with contributions by the old is a fixed point in the mapping from the pair of functions $[\tau_o(\cdot), Z_o(\cdot)]$ to the pair of functions $[\tilde{\tau}_o(\cdot), \tilde{Z}_o(\cdot)]$, where $\tau_o(K_{t+1})$ and $Z_o(K_{t+1})$ are the expected tax rate and political contribution in period $t+1$, $\tilde{\tau}_o(K_t)$ is the consumption-maximizing tax rate for the old, with associated campaign contributions $\tilde{Z}_o(K_t) = [G_o^*(K_t) - \theta\tilde{\tau}_o(K_t)RK_t - \tau_o(K_{t+1})K_{t+1}]/(b-\theta)$, and $K_{t+1} = 1 - [\tilde{\tau}_o(K_t) - 1]RK_t$.*

To identify the stationary equilibria, we can proceed as follows. First, hypothesize that the tax function has one of the following properties: (i) $\tau(K) = 0$; (ii) $0 < \tau(K) < 1 + (RK)^{-1}$; or (iii) $\tau(K) = 1 + (RK)^{-1}$. Then solve the maximization problem facing the lobby at time t, assuming that it expects taxes to behave in the hypothesized way in period $t+1$. Finally, examine the possibility of a fixed point in the mapping from expectations to the lobby's preferred tax rate, $\tilde{\tau}_{ot}$. We have applied this procedure in the appendix to rule out stationary equilibria with either $\tau(K) = 0$ or $0 < \tau(K) < 1 + (RK)^{-1}$. We conclude that a permanent, maximal subsidy to capital is the only remaining candidate for a stationary equilibrium.

Let us now verify the existence of such an equilibrium and examine its properties. We begin as before with the case in which the gross return to capital exceeds the weight the government attaches in its political support index to the well-being of the old (i.e., $\theta < R$). This is an interesting case, because it is one in which the lobby of the old succeeds in arranging special treatment for its members despite their weak position qua voters in the political process.

Assume the tax function takes the form $\tau_o = 1 + (RK)^{-1}$. Suppose for the moment that the lobby and the government at time t expected contributions to be zero in all

can use to implement its plan. All of these schedules give the government (epsilon more than) its reservation utility level for choosing the preferred tax rate $\tilde{\tau}_{ot}$, and something less for choosing any other rate.

future periods. Then $r_o(K) \equiv \tau_o(K)R$. Absent contributions in period t, the government would set τ_t to zero, because such a policy maximizes $\theta\tau_t RK_t + r_o(K_{t+1})K_{t+1}$ when $r_o(K_{t+1}) = R + 1/K_{t+1}$ and $\theta < R$. Evidently, some positive contributions from the lobby are needed to induce the government to choose $\tau_{ot} = 1 + (RK_t)^{-1}$. But then the conjecture that future contributions will be nil is not self-fulfilling.

Now suppose that positive contributions are expected for the future. Note that the current lobby will make positive contributions only if the current government would strictly prefer to choose some policy other than $\tau_{ot} = 1 + (RK_t)^{-1}$ in the absence of such offerings. It is readily shown that, with positive contributions expected for period $t + 1$, the government at time t would deviate to $\tau_{ot}^* = 0$ in the absence of contributions then.[16] It follows that $G_o^* = 1 + R(1 + RK_t) - Z_o(1 + RK_t)$ in the equilibrium that we are trying to construct.

Definition 2 gives the formula for the contributions needed to induce the lobby's preferred policy $\tilde{\tau}_{ot}$ in place of the one that the government would choose in the absence of such contributions. Using the expression for G_o^* and the hypothesis that $\tau(K) = 1 + (RK)^{-1}$ and $\tilde{\tau}_{ot} = 1 + (RK_t)^{-1}$, we have

$$\tilde{Z}_o(K_t) = \frac{1}{b-\theta}\left[(R-\theta)(1+RK_t) + Z_o(0) - Z_o(1+RK_t)\right].$$

If the contribution function $Z_o(\cdot)$ is to be part of a stationary equilibrium, then the mapping to $\tilde{Z}_o(\cdot)$ must yield a fixed point for all values of K_t. This gives us the functional equation

$$Z_o(K) \equiv \frac{1}{b-\theta}\left[(R-\theta)(1+RK) + Z_o(0) - Z_o(1+RK)\right]. \tag{7}$$

The functional equation (7) has a linear solution of the form

$$Z_o(K) = \frac{R-\theta}{b+R-\theta}(1+RK). \tag{8}$$

[16] Suppose, to the contrary, that $\tau_{ot}^* > 0$. Then τ_{ot}^* would need to satisfy the first order condition for maximizing $G_{ot}^* = 1 + RK_{t+1} - Z_o(K_{t+1}) + \theta\tau_{ot}RK_t$, namely $Z_o'(K^*) = R - \theta$, where $K^* = 1 - (\tau_{ot}^* - 1)K_t$. Substituting K^* into the expression for G_{ot}^*, and the result into the formula for $\tilde{Z}_o(K_t)$ given in Definition 2, we find that the latter is independent of K_t. But this contradicts the requirement that $Z_o'(K^*) = R - \theta$. Thus $\tau_{ot}^* > 0$ is not possible in a stationary equilibrium.

For certain parameter values and initial conditions, there may also be a continuum of nonlinear solutions.[17] Thus, whereas the policy path is uniquely determined whenever the old lobby the government, the size of the contributions made to support the equilibrium is not necessarily so. In the following discussion we characterize the properties of an equilibrium that has a linear relationship between the size of the old generation's contribution and its aggregate holdings of capital.

In the stationary equilibrium described by the tax function $\tau_o(K) = 1+(RK)^{-1}$ and the contribution function (8), the young pay all of their wages to the government to finance the subsidy to capital. The subsidy leaves the old in period t with after-tax income of $1 + RK_t$. The old give a fraction $(R-\theta)/(b+R-\theta)$ of their income to the politicians, and consume the rest. Since the young have nothing left to save, the capital stock converges to $\bar{K}_o = 0$ in one period. In the steady state each old generation consumes $\bar{C}_o = b/(b+R-\theta) < 1$.

[17]The general solution to the functional equation (7) is given by

$$Z_o(K) = \frac{R-\theta}{R+b-\theta}(1+RK) + \frac{h(0)}{b-\theta} + h(K) ,$$

where h(K) is an arbitrary function that satisfies $h(1+RK) = -(b-\theta)h(K)$. For $Z_o(K)$ to be part of a stationary equilibrium, it must be the case that $0 \leq Z_o(K_t) \leq 1 + RK_t$ all along the equilibrium path, and also that the lobby finds it optimal to choose $\tau_{ot} = 1 + 1/RK_t$ when it expects the next period's contribution to be $Z_o(0)$ and that the government would find it optimal to deviate to $\tau^*_{ot} = 0$ were it to recieve no contributions and to anticipate the next period's contribution to be $Z_o(1+RK_t)$. The latter two conditions further restrict the arbitrary function $h(K)$, for they require that

$$Z_o(X) \geq Z_o(0) + (R-b)X \ , \ \ \forall X \in [0, 1+RK_t]$$

and

$$Z_o(1+RK_t) \leq Z_o(X) + (R-\theta)(1+RK_t - X) \ , \ \ \forall X \in [0, 1+RK_t] \ .$$

It can be shown, for example, that if the initial K_0 and b are large, then the only continously differentiable $h(K)$ that can meet this requirements is $h(K) \equiv 0$; i.e., the contribution must be linearly related to the capital stock.

Note that the fraction of output that is used up in the political process, $(R - \theta)/(b+R-\theta)$, is larger the larger is the gross return on capital and the smaller are the relative weights the government attaches to the welfare of the old and to contributions, compared to the welfare of the young. The government is most reluctant to transfer to the old when investment by the young would be highly productive and when the government's popularity depends little on the prosperity of the old and on its own campaign finances. In the limit, as both θ and b tend to zero (and hence the relative weight on the welfare of the young grows large) the entirety of aggregate output is swallowed up by the political system, as the old induce the politicians to grant a highly unpopular subsidy.

Now suppose that $\theta > R$. In this case, a government in period t anticipating a tax of $\tau_o(K_{t+1}) = 1 + (RK_{t+1})^{-1}$ and no contributions in the future would set $\tau_{ot} = 1+(RK)^{-1}$ even in the absence of any contributions from the lobby representing its old constituents.[18] It follows that $\tau_o(K) = 1+(RK)^{-1}$ and $Z_o(K) = 0$ comprise a stationary equilibrium. In this equilibrium, which is in fact unique, the capital stock converges in one period to $\bar{K}_o = 0$, while consumption converges to $\bar{C}_o = 1$. Although the politics force the economy into a constant, low level of output, nothing further is lost in wasteful campaign spending.

It is not surprising that the government would be willing to subsidize the old in a stationary political equilibrium when $\theta > R$. After all, the politicians receive strong political support from the old in this case. What is surprising, perhaps, is the uniqueness of the equilibrium. Recall that when campaign contributions are not part of the political landscape, there exists a stationary equilibrium with $\tau(K) = 1+(RK)^{-1}$, but also others with $\tau(K) = A/K+\theta/R$ or $\tau(K) = \min[A/K+\theta/R, 1+(RK)^{-1}]$. These latter equilibria have a long-run capital stock that is positive in some or all periods. Here, the fact that the old might make political contributions eliminates these alternatives as potential equilibria, even though the old actually

[18] With $\tau_o(K_{t+1}) = 1+(RK_{t+1})^{-1}$, $Z_o(K_{t+1}) = 0$, and $Z_{ot} = 0$, the government at time t chooses τ_{ot} to maximize $\theta\tau_{ot}RK_t + 1 + RK_{t+1}$, subject to $0 \le \tau_{ot} \le 1+(RK_t)^{-1}$ and $K_{t+1} = 1-(\tau_{ot}-1)K_t$. The solution has $\tau_{ot} = 1+(RK_t)^{-1}$ when $\theta > R$.

contribute nothing in the equilibrium that does emerge.

4.3 Contributions by a lobby representing the young

In some political settings it is the young, rather than the old, who are most active in special-interest politics. Since the young provide labor services and save for the future, they may be represented in the political process by a coalition of "organized labor." In our model such a lobby would seek high taxes on installed capital and to protect (and augment) its members' wage income. We examine the consequences of such lobbying now.

A lobby representing the young in period t seeks to maximize its members' expected future consumption. The young save everything that is not contributed to politicians or paid in taxes, and later consume all of the after-tax return on their savings. If the lobby pays Z_t in contributions to the government in period t and thereby induces a capital tax of τ_t, then savings by the young will be $K_{t+1} = 1-(\tau_t-1)RK_t-Z_t$ and their expected consumption $C_{t+1} = R\tau_y(K_{t+1})K_{t+1}$, where $\tau_y(\cdot)$ is the stationary function relating the expected tax rate to the capital stock.

As before, we can think of the lobby as choosing a tax rate and contributing what is needed to make the politicians go along with the choice. The government can always achieve a reservation level of political support equal to $G_y^*(K_t)$ by setting the tax that maximizes $\theta\tau_t RK_t + \tau_y(K_{t+1})RK_{t+1}$ and then declining the lobby's offer of support. If the lobby wants the government to choose a tax $\tilde{\tau}_t$ different from this one, it must offer contributions of at least $\tilde{Z}_t(K_t) = [G_y^*(K_t)-\theta\tilde{\tau}_t RK_t-\tau_y(K_{t+1})RK_{t+1}]/b$. Of course, it would have no reason to donate more than this amount.

When the lobby makes the minimal contribution needed to induce the policy τ_t, it leaves its young members with aggregate savings of

$$K_{t+1} = 1-(\tau_t-1)RK_t - \frac{1}{b}[G_y^*(K_t) - \theta\tau_t RK_t - \tau_y(K_{t+1})RK_{t+1}]. \tag{9}$$

This equation implicitly gives the capital stock in period $t+1$ as a function of the current capital stock and the tax rate. Denoting this functional relationship by $K_{t+1} \equiv \kappa(K_t, \tau_t)$, we can formulate the lobby's problem as follows:

$$\max_{\tau_t} \tau_y[\kappa(K_t,\tau_t)]R\kappa(K_t,\tau_t) \tag{10}$$

$$\text{subject to (i) } \tau_t \geq 0 \text{ and (ii) } \kappa(K_t,\tau_t) \geq 0 \,.$$

The solution to (10) gives the politically-optimal tax rate $\tilde{\tau}_y(\cdot)$ as a function of the predetermined capital stock.

The tax rate $\tilde{\tau}_y(K_t)$ depends upon the lobby's and the government's expectations about the future. These expectations are summarized in the tax function $\tau_y(K_{t+1})$. Once again, we seek a fixed point in the mapping from expectations to the current policy function. In such a stationary equilibrium (which we will not define formally), the lobby for the young contributes

$$Z_y(K_t) = \frac{1}{b}\left(G_y^*(K_t) - \theta\tau_y(K_t)RK_t - \tau_y\{\kappa[K_t,\tau_y(K_t)]\}R\kappa[K_t,\tau_y(K_t)]\right) \,. \tag{11}$$

What policy does the young lobby induce in a stationary equilibrium? In the appendix we show that the young would never tolerate a maximal subsidy to capital. This leaves the possibility that $0 < \tau_y(K) < 1 + (RK)^{-1}$ or that $\tau_y(K) = 0$. We consider each of these possibilities in turn.

If the lobby in period t induces a tax that is neither zero nor $1 + (RK_t)^{-1}$, it must be that its objective in (10) achieves a maximum at some interior value(s) of τ_t. The derivative of the lobby's objective with respect to τ_t is given by $R[\tau_y(K_{t+1}) + \tau_y'(K_{t+1})K_{t+1}]\partial\kappa(K_t,\tau_t)/\partial\tau_t$. From (9) we calculate

$$\frac{\partial\kappa(K_t,\tau_t)}{\partial\tau_t} = \frac{-(b-\theta)RK_t}{b + R[\tau_y(K_{t+1}) + \tau_y'(K_{t+1})K_{t+1}]} \,,$$

which is never zero when $K_t > 0$. Therefore, the derivative of the lobby's objective vanishes if and only if

$$\tau_y(K_{t+1}) + \tau_y'(K_{t+1})K_{t+1} = 0 \,. \tag{12}$$

In the event, the lobby at time t is indifferent among the alternative possible tax rates, because all such rates (and associated contributions) leave it with the same expected consumption in period $t+1$.

Evidently, a stationary equilibrium can obtain if $\tau_y(K) + \tau_y'(K)K = 0$. This differential equation has the general solution $\tau_y(K) = A/K$, for arbitrary values of A. The free parameter A must be non-negative to ensure non-negative after-tax income for the old, and it must not be too large (see below) to ensure non-negative contributions from the young. For a range of values of A, the tax function is self-fulfilling.

If $\tau_y(K) = A/K$, then the young in period t expect to consume AR in period $t+1$, no matter what tax policy they choose to induce. So they are happy to have the government set $\tau_{yt} = A/K_t$. The contributions necessary to induce this policy can be calculated using (11); they are equal to $Z_{yt} = (\theta/b)(1+RK_t-AR)$.[19] For $A \leq 1/R$ (and some other values, depending on initial conditions), these contributions remain non-negative all along the equilibrium path.

The stationary equilibria with lobbying by the young feature consumption by the old of $C_t = AR$ in all periods. For A close to zero, most of the economy's output is wasted in the political process. For $A = 1/R$, we have $C_t = 1$, which is still less than what would be consumed in the absence of intergenerational redistribution. Interestingly, the economy might continue to grow, even in the long run. The capital stock evolves according to

$$K_{t+1} = \frac{b-\theta}{b}(1 - AR + RK_t) \ ,$$

which is a stable process when $R - \theta R/b < 1$, but an unstable one otherwise. In the latter case, the economy experiences sustained growth, with capital and output growing at long-run rate $R - 1 - \theta R/b$. But none of the extra output finds its way to consumers. Rather, growth feeds ever-expanding political waste.

A remaining possibility is that $\tau_y(K_t) = 0$. But this is just a special case of the type of stationary equilibrium that we have just described. In such an equilibrium (which has $A = 0$), the young expect to lose everything once they grow old. They are willing to contribute a portion of their income to the government in exchange for a

[19] Note that the government expecting a tax of A/K_{t+1} in period $t+1$ would set the current tax equal to $1 + (RK_t)^{-1}$ in the absence of any contributions from the young. It follows that $G_y^*(K_t) = \theta(1 + RK_t) + RA$.

maximal wage subsidy, but they do not benefit from doing so. All output goes either directly to politicians, or to investments which produce the wherewithal for later influence payments. The government collects contributions of $Z_{yt} = (\theta/b)(1 + RK_t)$, which may increase without bound or converge to a constant level. In either case, each successive government garners no more popularity than it otherwise would have if contributions were to be banned during its term in office.

4.4 Recap

A lobby representing a generational interest may offer contributions to candidates and parties in order to curry their favor. When only one of the age groups uses its financial resources to garner special treatment, the political equilibrium is much changed from what would occur in the absence of such rent-seeking behavior.

When only the old contribute to political campaigns, the political outcome is heavily skewed in their favor. All stationary equilibria have a maximal subsidy to capital financed by a 100% tax on wage income in every period. There are two negative features of such political equilibria. First, the prohibitive wage tax leaves the young in each period with nothing to invest. By the time they are old and politically powerful, each generation has no capital with which to produce output. Thus, each old generation captures at best a large share of a small pie. Second, the old may need to give away a portion of this pie in order to secure their favored treatment. These political donations diminish further the amount that is actually consumed. In the worst case—which arises when the young receive a very high weight in the government's political index—the entirety of output is swallowed up by the political process, and generation after generation consumes nothing at all.

The outcome is not fully symmetric when only the young lobby. Unlike the old, the young cannot guarantee their own consumption by co-opting the short-lived politicians. Successive generations of young can arrange transfers from the contemporaneous old, but if the groups do not remain politically active, they will not be able to protect themselves from similar treatment at the hands of the following period's young. In a political setting in which only the young are organized as a lobby, there are multiple stationary equilibria. All these equilibria have after-tax capital income equal in every period to a different constant. When the young expect that the succeeding period's tax will leave them with a fixed amount of income irrespective of their capital holdings, they become indifferent among political outcomes in the period in which they actively lobby. The stationary equilibria can have steady-state consumption as small as zero or as large as one, but never as large as consumption would be in an equilibrium without redistributive politics.

5 Interest-group Competition

In many polities, lobbies representing the young and the old are active concurrently. Indeed, the age-old struggle between capital and labor can partially be viewed in these terms. Generational interest groups may vie for political favors by offering their separate contribution schedules to the resource-hungry politicians. Of course, the government cannot favor both groups simultaneously, because the struggle over distribution allows at most one net beneficiary.

Our analysis of polities with competing interest groups builds on the work of Bernheim and Whinston (1986). These authors have described a *menu-auction game* in which several "principals" submit competing contingent bids in order to influence the actions of an "agent". They have established that such games typically have many equilibria, because bids attached to actions not actually taken by the agent in equilibrium affect the allocation of surplus. They have also argued that outcomes supported by *truthful contribution schedules* may be focal in the set of equilibria, because the set of best responses to any contribution schedule always includes one that is truthful and because equilibria supported by such schedules are the only ones that are coalition-proof. A truthful contribution schedule has the property that the difference between any two positive bids attached to different actions exactly reflects the difference in welfare that the principal making the bid would realize under the alternative actions.

Following Bernheim and Whinston (1986), we focus our attention on truthful equilibria.[20] In such an equilibrium, the old tailor their political contributions so that an extra dollar of after-tax income elicits an extra dollar of donation, over the entire range of policies for which contributions are positive. Such a contribution schedule takes the form

$$Z_o^T(\tau_t, K_t) = \max\ [0,\ \tau_t R K_t - C_o(K_t)]\ , \tag{13}$$

for some constant $C_o(K_t)$. We have made the constant a time-invariant function of the (pre-determined) capital stock, in anticipation of our search for stationary equilibria. Also, we have used the notation $C_o(\cdot)$ for the constant, because the old consume $\tau_t R K_t - Z_{ot}$, which equals the constant in (13), whenever the contributions are positive. Truthfulness dictates the shape of the contribution schedule in (13), but the lobby is free to choose the constant. Naturally, it does so to maximize its consumption.

For the young, a truthful contribution schedule reflects the net return to capital anticipated for the succeeding period. The lobby representing the young in period t expects consumption in period $t+1$ to be $r(K_{t+1})K_{t+1}$, where $r(K_{t+1}) \equiv \tau(K_{t+1})R - Z_o^T[\tau(K_{t+1}), K_{t+1})]/K_{t+1}$. Here $\tau(\cdot)$ again represents a stationary tax function, while $Z_o^T(\cdot)$ represents a stationary contribution function. With these expectations about the future politics, expected consumption in period $t+1$ depends on the capital K_{t+1} that the period-t young will hold at the time. We let $k(C_{t+1})$ represent the inverse of this relationship; that is, the amount of capital the period-t young must accumulate in order to achieve expected consumption of C_{t+1}, given their beliefs about the tax function $\tau(\cdot)$ and the lobbying costs $Z_o(\cdot)$.[21]

The contribution by the young in period t is the difference between their after-tax wage income of $1-(\tau_t - 1)RK_t$ and their savings. Of course, the contributions cannot be negative. Taking this into account, a truthful contribution schedule for the young

[20]The reader will come to realize that all stationary equilibria with a single lobby group can be supported as truthful equilibria. Thus, our restriction here has no bearing on our earlier analysis.

[21]In the event that the functional dependence of C_{t+1} on K_{t+1} is not invertible, we will choose the shape of $k(\cdot)$ to satisfy the requirements of a stationary and truthful equilibrium.

has the form

$$Z_y^T(\tau_t, K_t) = \max\ \{0,\ 1 - (\tau_t - 1)RK_t - k[C_y(K_t)]\}\ , \tag{14}$$

where $C_y(K_t)$ is a constant. The young of period t will consume $C_y(K_t)$ in period $t+1$, if contributions turn out to be positive. Again, we have taken the constant to be a function of the (pre-determined) capital stock of period t, because we seek a stationary equilibrium. The lobby representing the young chooses this constant in order to maximize its members' expected future consumption.

We examine the Nash game in which one lobby chooses $C_o(K_t)$ to maximize consumption by the old, taking $C_y(K_t)$ as given, and the other chooses $C_y(K_t)$ to maximize expected consumption by the young, taking $C_o(K_t)$ as given. As we have noted, the consumption of the old is just equal to $C_o(K_t)$ whenever $Z_o^T(\tau_t, K_t) > 0$ and the expected consumption of the young is just equal to $C_y(K_t)$ whenever $Z_y^T(\tau_t, K_t) > 0$. Let us suppose for the moment that both groups do make positive contributions in the stationary equilibrium. Then the government's political support index is given by $G_b(K_t) = \theta C_o(K_t) + C_y(K_t) + b[Z_o^T(\tau_t, K_t) + Z_y^T(\tau_t, K_t)]$, or[22]

$$G_b(K_t) = -(b-\theta)C_o(K_t) + C_y(K_t) + b\{1 + RK_t - k[C_y(K_t)]\}\ . \tag{15}$$

Notice that $G_b(K_t)$ does not depend on τ_t in this case. It follows that a government confronted by truthful contribution schedules will be indifferent between all tax rates that elicit positive contributions from both lobbies.

Now consider the problem confronting the lobby of the old. It knows that it can increase $C_o(K_t)$ without affecting the government's policy decision, as long as the relevant options for the government all elicit positive contributions. But some policies available to the government may invoke a zero contribution from the lobby for the old. Among these, the one that yields the government the greatest welfare is the one that maximizes the sum of θ times consumption by the old, consumption by the young, and b times contributions from the young. Suppose, for example,

[22] We use the "b" subscript to indicate the level of political support in an equilibrium in which *both* groups lobby.

that the lobby representing the old were to raise $C_o(K_t)$ so much that all policy choices generated a zero contribution from that lobby. Then the government could nonetheless achieve political support equal to

$$G_{-o}(K_t) = \max_{\tau_t} \; \theta\tau_t RK_t + C_y(K_t) + b\{1 - (\tau_t - 1)RK_t - k[C_y(K_t)]\} \; .$$

This political support index—which has the subscript "$-o$" to suggest that it is what the politicians would attain in the absence of contributions from the old—reaches a maximum at $\tau_t = 0$. Therefore

$$G_{-o}(K_t) = C_y(K_t) + b\{(1 + RK_t) - k[C_y(K_t)]\}. \tag{16}$$

Clearly, the lobby for the old must not raise $C_o(K_t)$ to a point where $G_b(K_t) < G_{-o}(K_t)$, or else the government will surely set $\tau_t = 0$ and leave its members with consumption of zero.

The lobby for the old should choose the maximum value for $C_o(K_t)$ that satisfies the constraint $G_b(K_t) \geq G_{-o}(K_t)$. But notice that the constraint can only be satisfied when $C_o(K_t) = 0$. It follows that the old must contribute *all* of their after-tax income of $\tau_t RK_t$ to the government in order to avert a prohibitive tax on capital income.

What about the lobby representing the young? In equilibrium, this lobby takes as given that $Z_{ot}(K_t) = \tau_t RK_t$ and that $C_o(K_t) = 0$. Since the equilibrium we are after is a stationary one, the lobby recognizes that the same outcome is bound to happen in period $t+1$. Therefore, the lobby of the young is indifferent in equilibrium among the alternative tax and contribution schedules. Still, we have assumed in deriving $C_o(K_t) = 0$ that the young are active in competition for the politician's favor, and that they offer a truthful contribution schedule. So we need to calculate what their contribution schedule must be, in order to validate the Nash behavior of the old.

Absent contributions by the young, the government can achieve political support of

$$G_{-y}(K_t) = \max_{\tau_t} \; \theta C_o(K_t) + r(K_{t+1})K_{t+1} + b[\tau_t RK_t - C_o(K_t)]$$

by choosing the politically-optimal policy in the light of the contribution schedule tendered by the old. With $C_o(K_t) = 0$ and expectations of the same for period $t+1$, the government's best choice in the absence of contributions from the young would be to set $\tau_t = 1 + (RK)^{-1}$. This would leave it with political welfare equal to

$$G_{-y}(K_t) = b(1 + RK_t).$$

But in the Nash equilibrium in which both lobbies participate, we must have $G_b(K_t) \geq G_{-y}(K_t)$. Given that $C_o(K_t) = 0$ and that $C_y(K_t) = C_o(K_{t+1}) = 0$, this requires $k[C_y(K_t)] = k(0) = 0$. Since $K_{t+1} = k[C_y(K_t)]$, we conclude that the young amass no savings; either $\tau(K) = 1 + 1/(RK)^{-1}$ and the young pay all of their income in wage taxes, or else $\tau(K) < 1 + 1/(RK)^{-1}$ and the young do have after-tax earnings but contribute everything to the government.

We can now fully describe the stationary equilibria. The lobby representing the old offers the contribution schedule $Z_o^T(\tau, K) = \tau RK$. That representing the young offers the schedule $Z_y^T(\tau, K) = 1 - (\tau - 1)RK$. As a result, the government collects all of national output as political contributions, no matter what (feasible) policy it chooses. The tax function $\tau(K)$ is not uniquely determined, but neither is it important. Whatever the tax function, the economy converges in one period to a steady state with $\bar{K} = 0$ and $\bar{C} = 0$.

In our model, competition between generational interest groups has a devastating effect on the economy. As each group bids more and more to tilt the outcome in its own direction, the entire economy gets swallowed up by the political process. Of course, this result is quite extreme and reflects the impossibility of allocative inefficiency in our simple model economy. Still, it does reveal a Bertrand-like feature of political competition. That is, any given bid for influence by one interest group may induce its rival to bid slightly more in an effort to win the day. Neither side can win this battle when both are active contributors.

6 Concluding Remarks

We have used a simple and special model of the economy in order to lay bare the pure politics of intergenerational redistribution. Our model has several special features—including inelastic labor supplies, constant returns to capital, zero marginal utility from first-period consumption, and non-diminishing marginal utility from second-period consumption—which account for the extreme nature of some of our results. In a model with distorting taxes or diminishing marginal utility, the government would typically not choose to tax away all income from either generation. And in a model with consumption in the first-period of life, a government could always provide at least some felicity to its young constituents. Still, the forces that we have identified in their starkest form would be present as general tendencies in a more realistic model of the economy.

Amongst the findings that we believe to be robust are the following. First, when governments are unable to commit to a course of future redistributive policies, they will find it difficult to guarantee a high standard of living to their young supporters. If today's politicians suspect that transfers to the young will be undone by tomorrow's rulers (acting on behalf of the as-yet unborn), then they will be tempted to cater instead to the old. Second, when the political process does give extra weight to the old, the particularistic benefits they capture will come at the expense of savings by the young. In the event, the economy will have either a smaller capital stock or a slower growth rate in the long run than it would in the absence of intergenerational redistribution. Third, economic well-being can fall hostage to political expectations. There will often exist multiple political equilibria, some with high taxes on earned income arising because the politically-minded governments anticipate similar behavior from their successors. Fourth, the presence of a lobby group making political contributions in support of its members' special interest may generate a steady-state equilibrium with a low level of consumption in every period. Finally, competition between generational interest groups can be very intense and cause much of the economy's output to be wasted in the political process.

How can polities avoid the problems that we have described? Somehow, successive generations of politicians must be prevented from pandering to generational interest groups for their short-term political gain. A polity might try to introduce a constitutional constraint on the extent of politically-motivated redistribution, especially to the older generation. Unfortunately, it may be difficult to write a constitution that would distinguish political redistribution from well-intended redistribution. And even if such a constitution could be written, we fear that politicians would soon become adept at circumventing its constraints in order to further their political ends.

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APPENDIX

(i) Contributions from the old only

We establish that, in a polity where only the old offer campaign contributions, no stationary equilibrium has $\tau_o(K) = 0$ or $0 < \tau_o(K) < 1 + (RK)^{-1}$.

Suppose first that $\tau_o(K) = 0$. Then the government at time t, maximizing (6), would set $\tau_t = 1 + (RK_t)^{-1}$ even if $Z_t(\tau_t) \equiv 0$. The old at time t can do no better than the maximal capital subsidy, so they would indeed offer no contributions in this situation. The government's choice of tax in period t contradicts the assumed form of the stationary tax function.

Now suppose that $0 < \tau(K) < 1+(RK)^{-1}$. Recall that the lobby, in effect, chooses τ_{ot}, and does so to maximize $\tau_{ot}RK_t - Z_{ot}$, subject to $Z_{ot} = [G_o^*(K_t) - \theta\tau_{ot}RK_t - r_o(K_{t+1})K_{t+1}]/(b-\theta)$ and $K_{t+1} = 1 - (\tau_{ot} - 1)RK_t$. If the lobby at time t is to choose a tax $\hat{\tau}_{ot}$ such that $0 < \hat{\tau}_{ot} < 1 + (RK_t)^{-1}$, it must be that its net income reaches a (local) maximum at $\hat{\tau}_{ot}$. After substituting the constraints into its objective, the derivative of net income with respect to τ_{ot} is

$$\frac{RK_t}{b-\theta}\left\{b - [r_o(K_{t+1}) + r_o'(K_{t+1})K_{t+1}]\right\} \quad .$$

This derivative can vanish at $\hat{\tau}_{ot}$ under two circumstances. First, it may be that $r_o(K_{t+1}) + r_o'(K_{t+1})K_{t+1} = b$ for all K_{t+1}. Second, it may be that $r_o(\bar{K}) + r_o'(\bar{K})\bar{K} = b$ for some $\bar{K}$, and that $1 - [\tau_o(K_t) - 1]RK_t = \bar{K}$ for all K_t. We take up each of these possibilities in turn.

(a) If $r_o(K_{t+1}) + r_o'(K_{t+1})K_{t+1} = b$ for all K_{t+1}, then the net return function must have the form

$$r_o(K) = b + \frac{A}{K} \tag{A1}$$

for some constant A. Now suppose that $r(\cdot)$ has the form indicated in (A1). Then, $G_o^*(K) = A + b(1 + RK)$, because the government would set $\tau = 0$ in the absence of any contributions from the old. Substituting this value $G_o^*(K)$ in the formula for $Z_{ot}(K)$ in definition 2, and using (A1), we find $Z_o(K) = \tau_o(K)RK$. But this in turn implies that $r_o(K) \equiv \tau_o(K)RK - Z_o(K) \equiv 0$. This contradicts the supposition that $r_o(K)$ has the form given in (A1).

(b) If $1 - [\tau_o(K_t) - 1]RK_t = \bar{K}$ for all K_t then the tax function must have the form

$$\tau_o(K) = 1 + \frac{1-\bar{K}}{RK}. \tag{A2}$$

Contributions are the difference between the gross and net return on capital, i.e., $Z_o(K) \equiv \tau_o(K)RK - r_o(K)K$, or $Z_o(K) \equiv (1-\bar{K}) + RK - r_o(K)K$, in view of (A2). Since $r_o(\bar{K}) + r'_o(\bar{K})\bar{K} = b$, we have $Z'_o(\bar{K}) = R - b$.

In the absence of contributions from the lobby, the government at time t solves

$$G^*_o(K_t) = \max_{\tau_t} \; 1 - \bar{K} + R[1 - (\tau_t - 1)RK_t] - Z_o[1 - (\tau_t - 1)RK_t] + \theta R\tau_t K_t. \tag{A3}$$

Then either

$$\theta - R + Z'_o[1 - (\tau^*_{ot} - 1)RK_t] = 0 \tag{A4}$$

and $0 < \tau^*_{ot} < 1 + 1/RK$, or else

$$\theta - R + Z'_o[1 + RK_t] < 0$$

and $\tau^*_{ot} = 0$. In either case, the lobby at time t chooses its contributions to satisfy

$$(b-\theta)Z_o(K_t) \equiv G^*_o(K_t) - \theta(1-\bar{K}) - \theta RK_t - (1-\bar{K}) - R\bar{K} + Z_o(\bar{K}) \quad \text{for all } K_t. \tag{A5}$$

Suppose that $\tau^*_{ot} > 0$. Then differentiating (A5) and using (A3) and (A4), we have

$$(b-\theta)Z'_o(K_t) = 0 \text{ for all } K_t,$$

which is consistent with $Z'_o(\bar{K}) = R - b$ only if b happens to equal R. But if $R = b$ and $Z'_o(K) = 0$, then (A4) implies $\theta = R = b$, which contradicts our assumption that $b > \theta$.

Now suppose that $\tau_{ot}^{*} = 0$. Then differentiating (A5) and using (A3), we have

$$(b-\theta)Z_o'(K_t) = R^2 - \theta R - RZ_o'(1+RK_t) \quad \text{for all } K_t,$$

which is consistent with $Z_o'(\bar{K}) = R - b$ only if $b = \theta$. Again, this contradicts our assumption that $b > \theta$.

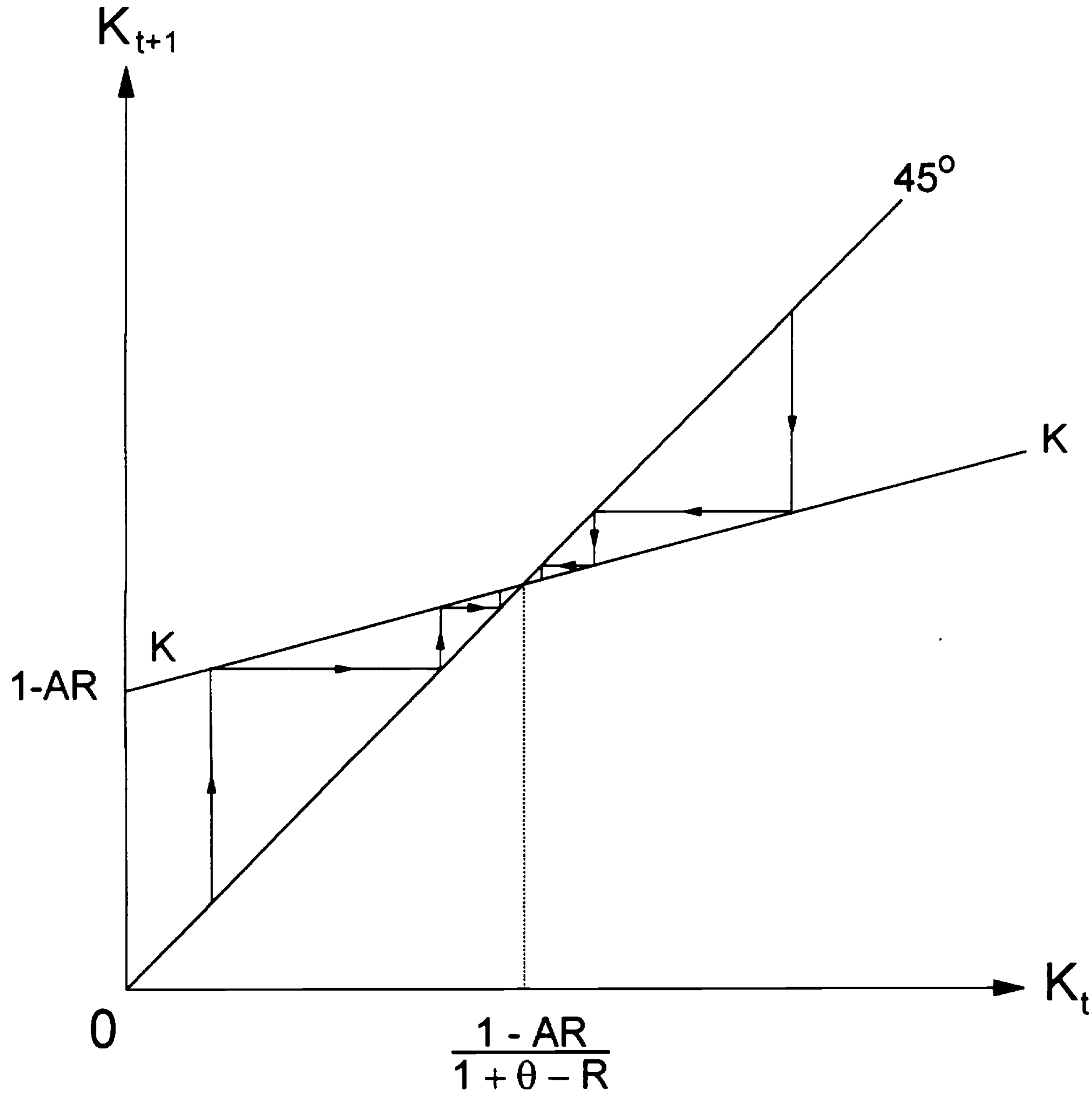
(ii) Contributions from the young only

Now we establish that, in a polity where only the young offer campaign contributions, no stationary equilibrium has $\tau_y(K) = 1 + (RK)^{-1}$. Suppose to the contrary that $\tau_y(K) = 1 + (RK)^{-1}$, and consider the problem facing the lobby of the young at time t. The lobby seeks to maximize $\tau_y[\kappa(K_t,\tau_t)]R\kappa(K_t,\tau_t)$ (see [10]), which in view of the expected tax function, implies that it seeks to maximize $\kappa(K_t,\tau_t)$, subject to $\tau_t \geq 0$. Since

$$\frac{\partial\kappa(K_t,\tau_t)}{\partial\tau_t} = \frac{-(b-\theta)RK_t}{b+R} < 0 ,$$

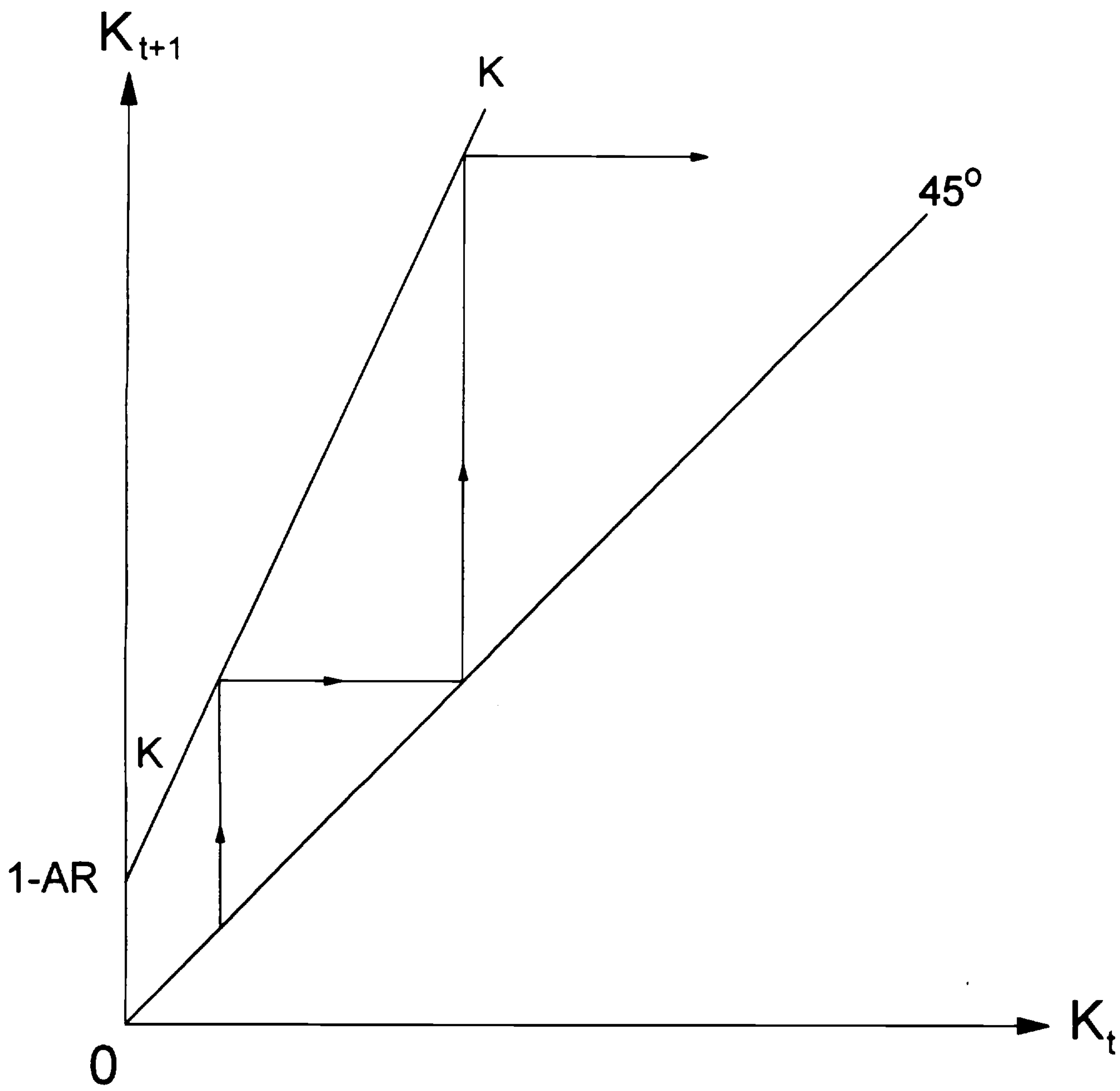
when $\tau_y(K) = 1 + (RK)^{-1}$, it always chooses $\tau_{yt} = 0$ in this situation. This contradicts the assumed form of the stationary tax function.

Figure 1



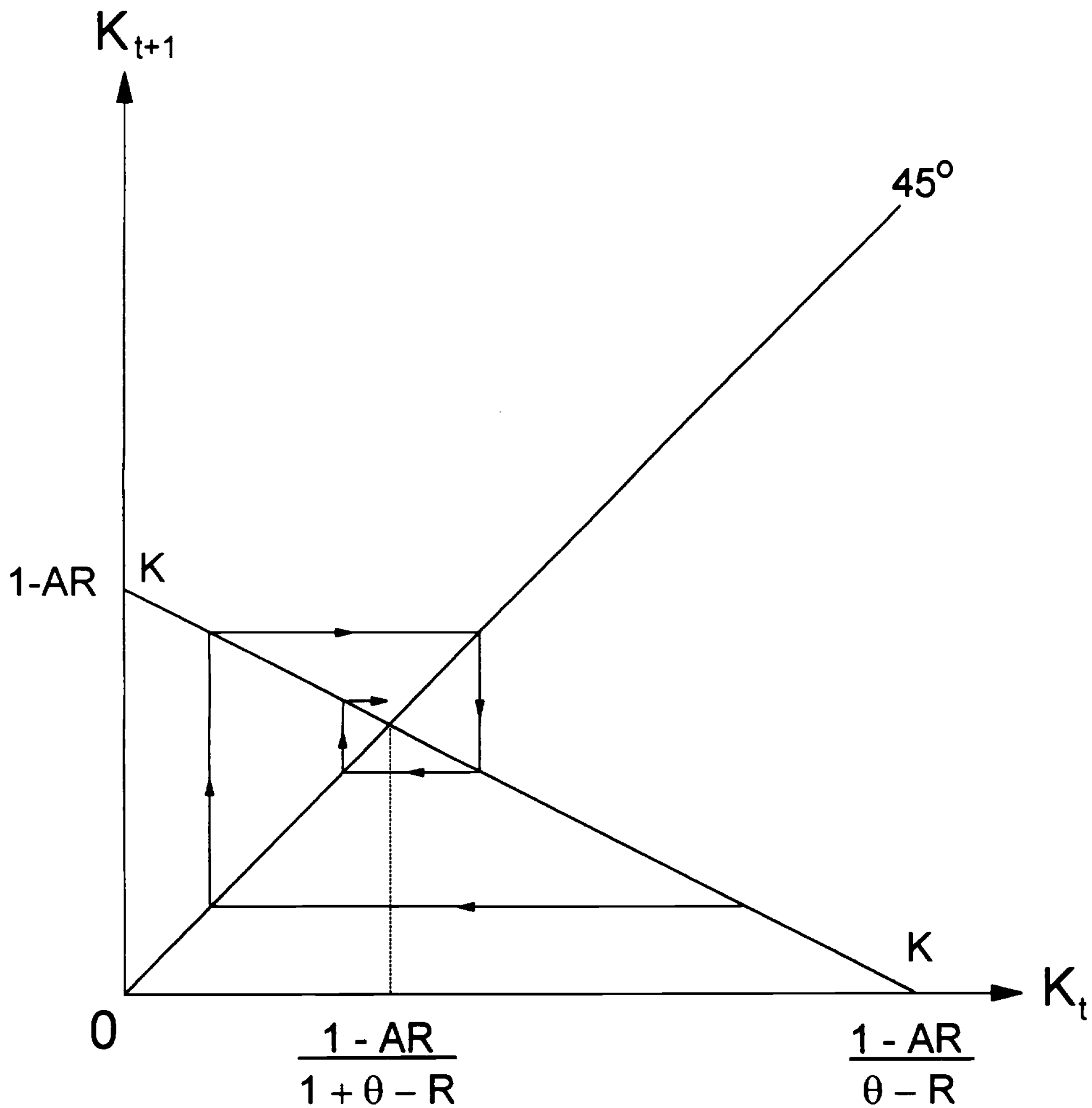
$\theta < R < 1 + \theta$

Figure 2



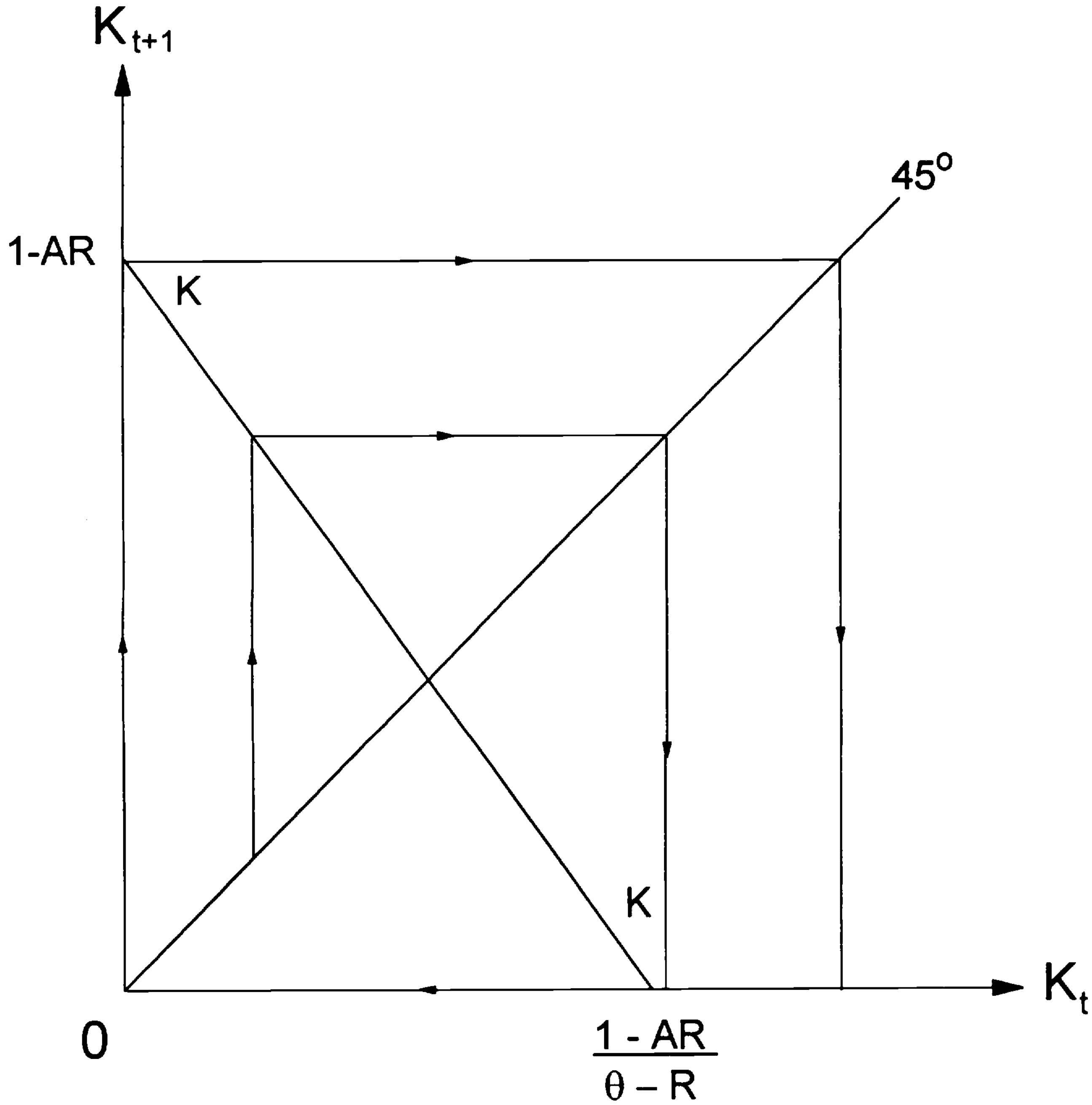
$1 + \theta < R$

Figure 3



$R < \theta < 1 + R$

Figure 4



$1 + R < \theta$