Dynamic Political Choice in Macroeconomics.

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Abstract

We analyze positive theories of redistribution, social insurance and public good provision in a dynamic macroeconomic framework. Political outcomes are determined via repeated voting and driven by a conflict of interests between agents. Voters and politicians rationally forecast the impact of current political choices on future political and economic outcomes. The theory is consistent with large differences in the size of governments across societies. These need not rely on intrinsic differences in preferences or technology, but may be driven by self-fulfilling expectations about the robustness of the welfare state.

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Key words: Markov equilibrium, multiple equilibria, political economy, public goods, redistribution, repeated voting, social insurance, welfare state.

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1 Introduction

The rise of the welfare state in industrialized countries in the 20th century has led to an unprecedented change in the size and scope of governments. The average size of government expanded substantially from the Great Depression to the 1980's, when some reduction took place, primarily in Anglo-Saxon countries. Currently, the future viability of welfare state institutions is being questioned, given challenges such as demographic changes and immigration. Understanding the sources of these dynamics is, in our opinion, among the most important tasks in economics.

To analyze these issues, economic theory must take account not only of the effects of policies on economic performance, but also of how economic performance feeds back into the determination of policies. Namely, political economy must be integrated into dynamic macroeconomic models. However, this research has been hampered by technical difficulties. This paper presents a new approach to analyze the dynamics of redistributive policies (such as government employment, redistribution, health care, or social security) overcoming some of these difficulties.

Our theory has the following building blocks:

1. Any political conflict originates from the fact that people are heterogenous. In the analysis of welfare state policies, age and earnings are among the most salient dimensions along which people differ. Individual earnings are, in turn, determined by individual investments, innate ability and luck.

2. In general, government activity has distortionary effects. In particular, welfare state policies reduce the returns to individual investments and effort by equalizing the *ex-post* income across agents. Thus, welfare state policies affect the distribution of individual earnings across voters over time.

3. In democracies, current policies are determined by political processes with a limited ability to commit to future policies. In particular, voters can neither commit to their own future voting behavior, nor commit the choices of future generations.

4. Future generations are under-represented in current political decisions by which they are affected.

In combination, these four points imply rich dynamic interactions between politics and macroeconomics. Current political decisions affect investment incentives which have an impact on the future income distribution and, hence, on the future political choices. This

creates scope for dynamic strategic policy-making: politicians and voters take into account the effect of their political choices on both macroeconomic and political dynamics.

This paper constructs an overlapping generations model where young agents make a human capital investment, determining their probability of success (as measured by income) in life.[1] As in point (1) above, agents do not only differ in age but also in luck and in innate ability, which determines the expected returns to human capital investments. The return to individual human capital investments is assumed to be stochastic with persistent effects on agents' income, making individuals more heterogenous as they grow older. Therefore, the initial investment, together with the realization of luck, tends to "lock-in" agents' preferences over redistribution. As in (2), there is a government that taxes agents and uses the proceeds to finance redistributive programs which distort human capital investment and have persistent effects on earnings distribution. As in (3), policies are determined through voting. Agents cannot commit to vote in a particular way in the future, and only living generations vote (as in (4)). Strategic motives for political choice (e.g., dynamic voting) arise from the fact that the endogenous evolution of income distribution depends on past, current and (expected) future policies.

We focus on two important components of redistributive government policies; transfers to low-income agents and the provision of public goods. Following common practice in the public economics literature, we impose restrictions on the policy space. In the transfer model (section 3), agents vote over benefits to low-income agents, financed by lump-sum taxation. In the public good model (section 4), agents vote over linear income taxation to finance a public good, where tax rates are allowed to be age-dependent. In both models, the investment of the young decreases in the extent of taxation.

We consider two alternative political mechanisms, i.e., majority voting and probabilistic voting. In the former, the median voter decides the policy outcome. In the latter, the intensity of preferences of different groups of voters is also of importance, and there is a smooth mapping from distribution of types into policy outcomes (see Persson and Tabellini, 2000, for details).

2 The model

The model economy consists of a continuum of two-period lived risk-neutral agents where each generation has a unit mass. Agents are of two types at birth; high- and low-ability, in

[1] The model builds on Hassler, Rodriguez Mora, Storesletten, and Zilibotti (2003), Hassler, Krusell, Storesletten, and Zilibotti (2002) and Hassler, Storesletten, and Zilibotti (2002). From now on, these paper will be referred to as HRSZ, HKSZ and HSZ, respectively.

proportion μ and $1-\mu$, respectively. High-ability agents can affect their prospects in life by an initial educational investment. In particular, they can be successful or unsuccessful and the investment increases their probability of being successful. The (effort) cost of investment is e^2, where e is the probability of being successful. Successful high-ability agents earn a high wage, w, whereas unsuccessful high-ability agents earn a lower wage, normalized to zero. Agents work in both periods of their life and the assumption of perfect correlation between first and second-period income is made for simplicity. Low-ability agents are deemed to be unsuccesful and earn a low wage, irrespective of their investment.

A government redistributes resources by transferring bw units of consumption to low income agents and provides a public good, denoted by g. We denote the income tax on old and young successful agents by τ^O and τ^Y, respectively. In some cases, we let the government have access to lump sum taxes, denoted by τ_t.[2] Taxes are set before the young agents decide on their investment. Fiscal policies are constrained to ensure that the government budget balances in every period and that $b \in [0,1]$, $\tau^Y \in [0,1]$, $\tau^O \in [0,1]$, and $\tau \in [0,w]$.

The expected utility of agents alive at time t is given as follows:

$$\begin{aligned}
\tilde{V}^{os}\left(g_t, \tau_t^O\right) &= w\left(1-\tau_t^O\right) - \tau_t + a g_t \\
\tilde{V}^{ou}\left(g_t, \tau_t^O\right) &= b_t w - \tau_t + a g_t \\
\tilde{V}^{y}\left(e_t, g_t, g_{t+1}, \tau_t^Y, \tau_{t+1}^O\right) &= e_t\left(1-b_t-\tau_t^Y+\beta\left(1-b_{t+1}-\tau_{t+1}^O\right)\right) w \\
&\quad -\tau_t - \beta\tau_{t+1} + a\left(g_t + \beta g_{t+1}\right) - e_t^2,
\end{aligned}$$

where $\tilde{V}^{os}$, $\tilde{V}^{ou}$, and $\tilde{V}^{y}$ denote the utility of old successful, old unsuccessful (including low-ability agents), and young high-ability agents, respectively. $\tilde{V}^{y}$ is computed prior to individual success or failure. $\beta \in [0,1]$ is the discount factor and a measures agents' marginal valuation of the public good, assumed to be constant.

It is straightforward to show that the solution to the optimal investment problem of the young, given policies, is $e_t^* = \left(1+\beta-\left(b_t+b_{t+1}+\tau_t^Y+\beta\tau_{t+1}^O\right)\right) w/2$ and we restrict the parameters and feasible policies to ensure that $e_t^* \in [0,1]$. Since high-ability agents are *ex-ante* identical, agents of the same cohort choose the same investment, implying that the proportion of old high-ability unsuccessful in period $t+1$, denoted by u_{t+1}, is given by $1-e_t^*$.

As a benchmark, political decisions are determined by the *ex-post* conflict of interests between individuals who know their productivity. To this end, we assume that only the old

[2] As mentioned above, we focus on economies where government activity is distortionary. Thus, in each of the cases which we examine, the government has access only to a subset of the policy instruments described in the general model.

have voting rights (see HRSZ, for microfoundations). We briefly comment on the case in which the young also participate.

3 Government transfers.

3.1 Inefficient redistribution

Following HRSZ, we assume that the government only provides transfers and that taxes are lump-sum and age-independent, i.e., for all t, $g_t = \tau_t^Y = \tau_t^O = 0$. Agents vote over redistribution, $b_t \in [0,1]$, and the government budget constraint pins down τ_t.

By substituting for τ_t and e_t^* in the government budget constraint, the indirect utility functions of the old can be written as:

$$V^{os}(b_t, b_{t+1}, u_t) = 1 - (\mu(1 - \beta + b_t + \beta b_{t+1}) + 2(1 - \mu + \mu u_t))\, b_t/4, \tag{1}$$

$$V^{ou}(b_t, b_{t+1}, u_t) = b_t - (\mu(1 - \beta + b_t + \beta b_{t+1}) + 2(1 - \mu + \mu u_t))\, b_t/4, \tag{2}$$

where, for simplicity, we set $w = 1$.

The old successful dislike transfers, since redistribution increases taxes and they are not entitled to benefits (see equation (1)). In contrast, equation (2) shows that the old unsuccessful are better off with some redistribution. Their preferences for redistribution are non-monotonic, however, due to a standard Laffer curve effect. Both groups dislike future redistribution (both V^{os} and V^{ou} are decreasing in b_{t+1}), since this is of no value to the old, while it distorts the investment incentives of the young and increases the number of young beneficiaries.

Under majority voting, b_t is chosen each period so as to maximize the utility of the group in majority that period. If the successful are in majority, they set $b_t = 0$. If the unsuccessful are in majority, they instead set $b_t > 0$. The maximization of V^{ou} over b_t shows that the level of benefits chosen by the unsuccessful depends negatively on both u_t and b_{t+1}. This dependence is the source of dynamic political choice: it would be irrational for voters (and politicians) at t to take b_{t+1} as parametric since the current choice of b_t affects u_{t+1} which, in turn, affects the future choice of b_{t+1}. In particular, the unsuccessful median voter can affect the identity of the median voter in the next period through the choice of b_t. If the successful agents are in majority next period, they will set $b_{t+1} = 0$, which benefits all old agents at t compared to a situation where the unsuccessful agents are in majority. Therefore, the old unsuccessful may find it optimal to strategically restrain their demand for current redistribution to ensure that such an anti-welfare state majority will materialize next period.

Our formal analysis focuses on Markov equilibria, i.e., agents do not take the future policy outcomes, but, rather, the equilibrium policy functions as given. These equilibria can be characterized by standard recursive methods, although in most cases, it is not possible to derive analytical characterizations. Linear-quadratic preferences, however, makes it possible to guess-and-verify the equilibrium policy functions and obtain a closed-form characterization of the equilibria.

HRSZ show that, in this model, multiple equilibria exist. One class of equilibria features the perpetual survival of the welfare state, as long as the old unsuccessful are initially in majority. In these equilibria, the old unsuccessful vote for generous transfer programs distorting individual incentives in a way that regenerates the constituency for the programs themselves (i.e., the unsuccessful remain in majority). Thus, redistributive programs are persistent. If, for instance, a shock such as the Great Depression suddenly increases the demand for redistribution, this demand may continue after the economy has actually recovered from the shock. Another example of such persistence is the dynamics of unemployment and unemployment insurance in European countries after the oil shocks. The shock increased unemployment and the political demand for more generous unemployment benefits, which arguably fed back into higher unemployment.

There is also another class of equilibria, where an existing welfare state is irreversibly terminated. In these equilibria, the old unsuccessful vote strategically for moderate redistribution, so as to induce a majority of successful that will vote for zero redistribution in the next period. The expectation that $b_{t+1} = 0$ induces the young to invest more in period t, thus reducing the number of transfer beneficiaries and the tax burden. Interestingly, these equilibria are more easily sustained when the pre-tax wage inequality is higher (i.e., larger w), since this strengthens the incentives for private investments and reduces the political support for redistributive programs. This prediction is consistent with the observation that, in the 1980's, Thatcher and Reagan were elected with a mandate to drastically downsize social policies during times associated with a significant increase in wage inequality in the UK and the US. In contrast, there were no large cuts in social expenditure in continental Europe, and there was only a small increase in wage inequality.

These results are sensitive to the specification of the voting mechanism. In a model of probabilistic voting, the voting equilibrium is a policy maximizing a weighted average of the utility of all voters. Under the assumption that all voters have a symmetric influence on the outcome, the winning politician chooses b_t so as to maximize $\mu(1-u_t)V^{os} + (1-\mu+\mu u_t)V^{ou}$. In this case, given u_0, the equilibrium features positive redistribution only as long as $u_0 > (1-\beta)/2$. The equilibrium level of b_t is linearly increasing with u_t and, if the economy starts with a positive level of redistribution, both b and u decline

monotonically over time, and in the long-run, there is no redistribution.[3]

Apart from generating different long-run predictions, the two political models have different transitional dynamics. Under majority voting, the equilibrium with the survival of the welfare state features oscillatory convergence to the steady-state, while, as mentioned above, probabilistic voting implies monotone convergence. These contrasting results arise from the presence of two opposite forces. On the one hand, the larger the current share of transfer beneficiaries, the higher the tax cost per unit of benefits. Thus, cost considerations tend to generate a negatively sloped relationship between b and u and, hence, oscillatory dynamics. On the other hand, under probabilistic voting, the larger is u, the larger is the political pressure for redistribution, since the weight of the unsuccessful increases with u. This political power effect tends to generate a positively sloped relationship between b and u and, hence, monotone dynamics. The political power effect dominates under probabilistic voting, thereby generating monotonic dynamics. If policies were always chosen by a particular group, whose identity remained unchanged over time, the political power effect would be absent. This is precisely what happens in the equilibrium featuring the survival of the welfare state. In this case, the dynamics are entirely driven by the cost effect, and convergence is oscillatory.

3.2 *Ex-ante* valuable redistribution

The analysis carried out so far focuses on inefficient redistribution. Since agents are risk neutral and redistribution is distortionary, a benevolent planner attaching arbitrary weights on the welfare of present and future generations would always choose zero redistribution except, possibly, in the first period.[4] There are, however, a variety of reasons why redistribution may be *ex-ante* desirable. A large body of literature has emphasized the efficiency-enhancing role of redistribution and public insurance in the presence of capital market imperfections (see e.g. Galor and Zeira, 1993, Benabou, 1996 and 2000, and Aghion and Bolton, 1997).

[3]This result can be interpreted as follows: when only the old influence the political outcome, the equilibrium redistribution, b, maximizes the average income of the old. This implies that the winning politician maximizes the intergenerational transfer from young to old agents, without any concern for intragenerational redistribution. Intergenerational transfers in favor of the current voters (i.e., the old) can, however, be achieved only if the proportion of old beneficiaries is higher than the proportion of young beneficiaries, i.e., if $u_t > u_{t+1}$. The gap $u_t - u_{t+1}$ shrinks along transition, and the proportion of beneficiaries approaches a steady-state level with no scope for redistribution.

[4]We refer to second-best efficiency as the (Ramsey) allocation chosen by a planner who can set, with full commitment, the path of benefits, $\{b_t\}_{t=0}^{\infty}$ but is subject to a period-by-period budget constraint and an implementability constraint, i.e. private agents investing according to $e^*(b_t, b_{t+1})$.

The insurance value of redistributive programs can only be captured by a model with risk averse agents. Unfortunately, even the simple model presented above becomes untractable under standard preferences featuring risk aversion (e.g., CRRA). HKSZ construct a modified version of the model where analytical solutions can be found, however. The key idea is to let the low-ability agents have a marginal utility $z > 1$, i.e. higher than that of the high-ability agents.[5] In a model with probabilistic voting, the winning politician maximizes $\mu(1-u_t)V^{os} + (z(1-\mu)+\mu u_t)V^{ou}$. In this case, the equilibrium features positive redistribution in the long run. The reason is that by having a higher marginal utility, the low-ability agents exert a larger political influence in determining the policies (in the political economy jargoon, they have more "swing voters"). The long-run size of transfers, as well as the dynamics of redistribution, depends critically on the parameter z. When the low-ability agents have a relatively low (high) marginal utility of consumption, the dynamics of transfers are monotone (oscillatory), and long-run transfers are small (large) in relative terms.

The normative analysis is richer in this case, since redistribution is intrinsically valuable. HKSZ characterize the second-best allocation, and show that this to be time-inconsistent. When, at time zero, the planner chooses the sequence of future redistribution, she takes into account how, for all $t > 0$, b_t influences effort in period $t-1$. In the first period, u_0 is predetermined, however, and the planner can ignore the distortionary effect of b_0 on e_{-1}. She is therefore induced to choose more generous redistribution. By the same token, in every period, the planner is tempted to re-optimize and deliver more redistribution than promised after an additional generation of old has invested. As opposed to the planner, the political equilibrium lacks a commitment technology to overcome this time-inconsistency (recall that agents cannot tie their hands with respect to their future voting behavior). For this reason, the political equilibrium fails to deliver the second-best amount of redistribution and, in most cases, provides too much redistribution. In addition, HKSZ show that the lack of commitment tends to dampen oscillations (compared to the second best outcome). In fact, in most cases, the second-best solution features limit cycles, whereas the equilibrium allocation always converges to a steady-state level of redistribution.

[5] More precisely, HKSZ assume that even low ability agents, who are assumed to be poorer than high ability agents, have stochastic lifetime earnings. In addition, all agents have a concave piecewise linear utility with a kink such that the consumption of unsuccessful low ability agents is below the kink, while the consumption of all other agents is always above the kink, irrespective of the redistributive policy. Thus, government transfers provide low-ability agents with valuable insurance.

4 Provision of public goods with age-dependent taxes

In this section, we follow HSZ and focus on the provision of public goods. The government can impose linear age-dependent taxes on income, but has no access to lump-sum redistribution ($\tau = 0$). Substituting for g_t and e_t^* in equations (1)-(2), the indirect utility functions of old agents can be written as:

$$V^{os}(\tau_t^O, \tau_t^Y, \tau_{t+1}^O, u_t) = 1 - (1 - a\mu(1 - u_t))\,\tau_t^O + aW(\tau_t^Y, \tau_{t+1}^O) \tag{3}$$

$$V^{ou}(\tau_t^O, \tau_t^Y, \tau_{t+1}^O, u_t) = a\mu(1 - u_t)\,\tau_t^O + aW(\tau_t^Y, \tau_{t+1}^O), \tag{4}$$

where

$$W(\tau_t^Y, \tau_{t+1}^O) = \mu\left(1 + \beta - \tau_t^Y - \beta\tau_{t+1}^O\right)\tau_t^Y/2$$

is the amount of public good financed by taxes levied on the young.

As before, we start our analysis with majority voting. In each period, agents vote simultaneously on the income tax rate on the old, τ_t^O, and the young, τ_t^Y. The public good is then determined by the government balanced budget condition. The analysis is simplified by the fact that voters' preferences over τ_t^O do not interact with variables determined in the future (see equation (3)-(4)). On the one hand, as long as $a\mu < 1$ (which we assume), the old have conflicting interests with respect to the current taxation of the old, τ_t^O: the successful want to set $\tau_t^O = 0$, while the unsuccessful prefer $\tau_t^O = 1$. On the other hand, the old agree on the taxation of the young. Their common objective is to set τ_t^Y so as to maximize $W(\tau_t^Y, \tau_{t+1}^O)$. Since τ_t^Y interacts with τ_{t+1}^O in this expression, the choice of τ_t^Y entails a forward-looking element and agents may vote strategically to influence the future choice of τ_{t+1}^O. In particular, the old can manipulate τ_{t+1}^O by taxing the young at a sufficiently low rate so as to induce high investment in period t, and a future majority of old successful who will set $\tau_{t+1}^O = 0$.

HSZ show that two sets of Markov equilibria exist under majority voting. In the first, $\tau_t^Y = 1/2$ and $\tau_{t+1}^O = 1$, for all $t \geq 0$.[6] The old unsuccessful are always in majority from period one onwards, there is a large government, and society is equal. Private investments and production are low, however. In the second, τ_{t+j}^Y is small and $\tau_{t+j+1}^O = 0$.[7] The old successful are always in majority from period one onwards, there is a small government, society is more unequal, and private production is higher. Identical societies may thus

[6] The taxation of the old in period zero depends on which group, either successful or unsuccessful, is initially in majority. But this has no implications for redistribution in the following periods.

[7] In particular, there is a continuum of such equilibria, each characterized by a different taxation of the young. For sufficiently small β and μ, in all such equilibria the tax rate of the young is lower than in the other equilibrium, i.e., $\tau^Y < 1/2$.

choose very different levels of public goods provision, taxation and redistribution. Except for extreme parameter values and beliefs, low-ability workers are better off in the equilibrium with a large government. Note that dynamic voting plays a key role in driving the existence of multiple equilibria. Indeed, if agents voted myopically, ignoring the effect of their political choice on future political choices, only the equilibrium with large governments would be sustained.

It is interesting to note that the political equilibrium with a large government features more taxation (as measured by the present value of taxes) than the allocation maximizing the steady-state public good provision. The latter allocation has full taxation of the old and zero taxation of the young. Voters, however, do not fully internalize the distortionary effect of taxing the young, as some of the burden of taxation of the young at t is borne by agents who are young at $t+1$.

Finally, under probabilistic voting, the equilibrium outcome is unique. As long as the marginal utility of the public good is sufficiently high, the old are fully taxed. If only the old vote, the equilibrium is indeed identical to that with a large government under majority voting. If the young also vote, the tax rate on the young is lower, but generally positive, and the results are qualitatively similar.

5 Concluding remarks

In this paper, we have reviewed and extended recent politico-economic models of dynamic political choice. To achieve tractability, we have restricted attention to specific functional forms (linear quadratic utility functions) and stylized environments (2-period overlapping generations). While we are not the first to incorporate dynamic political choice in macroeconomics, the previous literature had to resort to numerical simulations (see e.g. Krusell and Ríos-Rull, 1996 and 1999, and Saint Paul, 2001), which has often been regarded as a shortcoming of these theories.

In future, we aim at bringing empirical data to bear on the theory. In some work-in-progress, we introduce productivity shocks in a model with government transfer, and focus on how the endogenous policy determination generates persistence, even with i.i.d. technology shocks. We plan to compare the quantitative predictions of the model with data on output, employment and redistributive policies at business cycle frequencies.

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