

The Supply of Social Insurance

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Abstract

We propose a theory of the welfare state, in which social transfers are chosen by a governing group interacting with non-governing groups repeatedly. Social demands from the non-governing groups are credible because these groups have the ability to generate social conflict. In this context social insurance is supplied as an equilibrium response to income risks within a self-enforcing social contract. When we explore the implications of such a view of the social contract, we find four main determinants of the welfare state: the degree of aggregate income risk; the heterogeneity of group-specific income risks; the public administration's ability to implement group-specific transfers; and the ability of the non-governing groups to coordinate their social demands. We also analyze the link between public good provision and social insurance.

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1 Introduction

Social spending rose enormously in all rich democratic societies over the twentieth century. By the 1970s the modern structure of the welfare state was in place, consisting of an array of programs mainly designed to protect families against various income risks.¹ Conventional wisdom attributes the rise of the welfare state to demographic changes, coupled with economic growth, which created increasing social demand for fiscal redistribution and the means to meet it. This view presumes that social demands are fulfilled by the state, and that some voters have enough political power to extract transfers from relatively richer individuals, and yet they do not have enough power to exclude relatively poorer individuals from receiving similar transfers. Historically, however, take up of social transfers seems to fall with political power. Thus, social spending is allocated in a pro-poor fashion each year, whereas political influence rises with income.² What then determines the supply of social insurance?

Our thesis is that social insurance is a self-enforcing mechanism to balance distributional conflict, in which socio-economic groups are the main actors. A key distinction is between those individuals who can control public policy decision making, the governing group, and those who cannot, the non-governing groups. Our approach rests on three premises. First, taxes and spending are chosen by a governing group interacting with multiple non-governing groups repeatedly. Second, the power of the governing group is limited by the capacity of non-governing groups to generate social conflict. Third, risk averse individuals face group-specific income risks which are privately uninsurable.

In this context, we formalize the welfare state as a risk-sharing arrangement supplied by the governing group to the non-governing groups as part of an optimal rent extraction program, that is, a program designed to maximize the governing group's share of the social surplus. We

¹See Lindert (2004).

²See Benabou (2000).

then argue that repeated strategic interaction between the governing and the non-governing groups enables the latter to obtain a share of the efficiency gains from risk-sharing and cooperation, even though they do not have the power to control social transfers directly. When we explore the implications of such a view, we identify four main determinants of the social contract provided by the welfare state: the degree of aggregate income risk; the heterogeneity of group-specific income risks; the public administration's ability to implement group-specific transfers; and the ability of the non-governing groups to coordinate their social demands.

Formally, we consider a repeated game between one governing group and multiple non-governing groups. For simplicity, we assume that the governing group is homogeneous. The capacity of individuals in the non-governing groups to generate social conflict is modeled as an exit decision, which is costly to themselves and to the governing group. We view this as the source of the political limits on the behavior of the governing group.³ For simplicity, we also assume that each of the non-governing groups is homogeneous. In the stage game, the governing group chooses a schedule of lump sum transfers contingent on group-specific income realizations, and the non-governing groups choose whether or not to participate in the social contract. These choices are made simultaneously, before incomes are realized. Thus, the governing group is unable to commit not to expropriate the non-governing groups, and the latter are unable to commit not to generate social conflict.

Consider an equilibrium outcome of the stage game when there is a single non-governing group. That is, abstract for now from the fact that there is more than one non-governing group, and that the groups interact repeatedly. Suppose that the non-governing group chooses to

³Thus, our approach shares the common view that redistributive policy can avert social conflict, and that the threat of conflict endows social groups with *de facto* political power. This view underlies the work of Aumann and Kurtz (1986), Buchanan and Faith (1987), Weingast (1997), Falkinger (1999), Acemoglu and Robinson (2000), Bourguignon and Verdier (2000), Acemoglu (2003), Grossman and Kim (2003) and Hillman (2004), among others.

participate in the social contract. Then think of the governing group as choosing a schedule of state-contingent transfers, before knowing the realized income distribution, in order to extract all of the surplus. The optimality of the governing group's extraction program, subject to the non-governing group's participation constraint, generates equilibrium social insurance which is characterized by an efficient system of transfers. Consequently, a key property of equilibrium social insurance is that income tends to be transferred towards the non-governing group when its income realization is relatively low and when the actual income of the governing group is high.

In this context, we address the role of *aggregate* risk, as opposed to idiosyncratic risk, and also why a governing group may find it in its interest to respond to aggregate risk by redistributing resources towards those without direct influence over social policy. The main insight is that a riskier environment makes it more difficult for the governing group to meet the participation constraint of the non-governing group, which leads to further redistribution. Our approach has distinct implications for understanding the welfare state. First, the higher is the degree of aggregate risk the more redistributive is social spending. Second, although social transfers are conditional on income, they should not be understood as being purely means-tested, since they depend on the underlying risk and not just on the observed income realization. Third, an increase in redistribution can be expected even if the source of increased aggregate risk is an increase in risks that are specific to the governing group. Our argument is thus in sharp contrast with conventional explanations of the welfare state, which view social programs as either altruistic or designed specifically to give social protection to those with direct political influence, e.g., pivotal voters.

Now suppose that there are multiple non-governing groups, in which case the heterogeneity of group-specific income risks becomes important. We show that it is in the best interest of the governing group to create distinct transfer programs, each targeting individuals who

are subject to common income risks. To see why, first consider the case in which the governing group does not condition transfers on income realizations, but only on readily observable group characteristics, such as race, gender, union membership or old age. This situation may be viewed as constraining transfers to lump-sum amounts conditional on group identity alone. This type of transfer, however, prevents the governing group from exploiting the gains from social insurance and it is, therefore, suboptimal. Second, consider the case in which the governing group conditions transfers on all income realizations, but it offers the same transfer schedule to groups facing different risks. In this case the governing group loses its ability to target group-specific risks and hence, its ability to exploit all gains from social insurance. Thus, it is also suboptimal. As discussed in Section 2, this insight suggests a view of technical improvements in public administration and record keeping as an important force behind the proliferation of transfer programs and the enlargement of insurable events, which characterized the growth of the welfare state in the 1950s and 1960s. It also portrays the expansion of the welfare state as a process of exploiting the efficiency gains from social insurance.

The stage game is a useful vehicle to highlight the supply side of social insurance and to present some of our main ideas. However, it is arguably an inadequate characterization of the redistributive effects of the welfare state in democratic societies, because a static view of the interaction between the governing group and the non-governing groups suggests that the governing group always captures all of the surplus from the social contract. This may well be the case in non-democratic societies, yet it seems hardly a feature of the modern welfare state. Thus, in order to understand the redistributive effects of the welfare state within our framework, one must depart from the purely static view. Then, social cooperation through repeated interaction explains why non-governing groups can enjoy a significant share of the social surplus. The nature of a self-enforcing social contract is well understood from the theory of repeated games. Our contribution is to apply this theory to formulate the view of the wel-

fare state as a self-enforcing social contract. We show that the extent to which non-governing groups can coordinate their social demands determines their effectiveness in inducing the governing group to share more of the social surplus. Thus, more redistributive welfare states result when members of a society can overcome their coordination problems and agree to place larger social demands on the state. The self-enforcing nature of the social contract then compels the governing group to take into account those social demands and choose either to respect them or to embrace social conflict.

Throughout most of our analysis, we model transfers as net lump-sum transfers, which allows us to understand broad features of social contracts without having to track the complex underlying flows of taxes and benefit payments. However, this modeling strategy ignores the possible interaction between different types of expenditures. When we extend our basic model to allow for public good provision, we find that the supply of public goods by the governing group depends on the relative preferences for the public good of the governing and the non-governing groups. Public schooling is often viewed as relatively more valuable to non-governing groups, whereas national defense is viewed as more valuable to the governing group.⁴ Accordingly, we show that an increase in aggregate risk can induce an increase in spending on social insurance and public education, but a decrease in military spending. On the other hand, we find that increases in aggregate risk have no effect on public goods which are equally preferred by the governing and non-governing groups.

Our emphasis on the political power of a governing group is commonplace in sociology and political science, dating back at least to Pareto (1901).⁵ It is somewhat unusual in the economics literature, which tends to formalize redistributive politics in democracies as driven by

⁴See e.g., Boadway and Marchand (1995) and Thompson (1974), respectively.

⁵See e.g., Piven and Cloward (1971), Domhoff (1990, 1996) and Weingast (1997). Persson and Tabellini (2002) and Tsebelis (2002) stress the role of legislation, the judiciary and bureaucracies in explaining public expenditure.

the preferences of the pivotal voter.⁶ Moreover, conventional wisdom about the welfare state puts much emphasis on the negative effect of transfers on the incentives to create wealth.⁷ We shut down this mechanism in order to isolate the essential elements of our theory. In its emphasis on the central role of the public provision of insurance in the welfare state, our approach is related to the work of Persson and Tabellini (1996), Benabou (2000), Moene and Wallerstein (2001), Iversen and Soskice (2001) and De Donder and Hindriks (2003). By contrast, we focus on the supply side of the welfare state in the presence of pervasive commitment problems, and bring multidimensional policy conflict to center stage.

Section 2 reviews some evidence that the interests of the governing group have shaped the U.S. welfare state and briefly places our analysis in historical perspective. Section 3 presents the stage game between the governing group and a single non-governing group. This static model provides basic insights on social insurance. Section 4 considers repeated interaction between the governing group and multiple non-governing groups, and gives insights on the role of social consensus, protest, and social exclusion in understanding the distribution of income after taxes and transfers. Section 5 considers the structure of social transfers in detail. Section 6 broadens the scope of our analysis beyond income transfers to include public goods. Section 7 concludes. Proofs of all propositions are relegated to the Appendix.

2 Some Historical Evidence

The simple analytical framework of this paper captures the most conspicuous features of the welfare state. Thus, starting with the introduction of the Social Security Act of 1935, the history of the U.S. welfare state is one of enlargement of insurable events, involving the introduction

⁶See, e.g., Meltzer and Richard (1981). For a critical discussion, see Benabou (1996); see Grossman and Noh (1994) for an interesting exception to the median voter approach to distributional conflict in economics.

⁷See e.g. Atkinson (1995) and Benabou (2000) for counter-arguments.

of subsequent programs, with an increasingly narrow targeting of specific risks, and gradually extending eligibility to include previously excluded groups of individuals.⁸ European welfare states have gone through a broadly similar process over the twentieth century.

A key element of our theory is the existence of the governing group and the non-governing groups. As a matter of interpretation, we take the view that the governing group consists of the upper tail of the income distribution. Whether the governing group is the top 1% of the income distribution, as a power elite approach contends, or the top 50% as an electoral approach might, is not important for our main arguments, although it does have empirical implications. We simply take as given that there is such a governing group and we consider a period of time where the governing group is stable.⁹ As an empirical matter, the identity of the governing group is likely to vary across specific historical contexts. Domhoff (1990, 1996), Quadagno (1984) and Alston and Ferrie (1993) have stressed the role of political elites in the formation of the welfare state in the United States.¹⁰ Quadagno (1984, p. 644–645) emphasizes that the Social Security Act of 1935, which marks the birth of the U.S. welfare state, including old age assistance, old age insurance and unemployment insurance, “was implemented with almost no working-class input” remarking that:

Business executives had a direct impact on the Social Security Act by serving on policy-forming committees and by testifying before Congress. They also exerted influence in a less formal manner through a variety of interactions with state managers who held varying degrees of power. Tactics

⁸See e.g. Moffitt (2002) and Currie (2004) for a discussion of some of the main social programs.

⁹See Tullock (1981) for a discussion of stability of voting outcomes in democratic societies.

¹⁰The origin of the welfare state in countries other than the U.S. suggests too that our framework is plausible and has wide applicability. For instance, Steinmo (1993, p. 88) traces the origin of the welfare state in Sweden to a historic agreement between the Swedish Employers Federation (SAF) and the major trades union congress (LO) in May of 1936, and argues that the postwar social policies of Sweden reflected this historic compromise between the agenda setting power of “big business” interests and the power of labor unions to disrupt production.

included informal discussions with Roosevelt and committee members, letter writing, proposal development, and attempts to coopt lesser figures.

The logic of our theory supports the emphasis placed on the Great Depression by Weaver (1983) and Quadagno (1984) regarding the timing of the Social Security Act of 1935; and it is consistent with the decline in the income shares at the top of the distribution in the decade following the Act (Kuznets, 1953). Our theory provides a plausible reason why the increase in *aggregate* risk brought about by the Great Depression could have induced greater redistribution from the governing group to the non-governing groups. Our argument also suggests that social movements such as the Townsend movement were ineffective in bringing about social insurance prior to the Great Depression because the increase in aggregate risk had not yet been clearly perceived.

Alston and Ferrie (1993) observe that Southern large plantation owners formed a major segment of the U.S. governing group for a century preceding 1970, operating through overwhelming Congressional committee control via the Democratic Party. The rural elite's political objectives were to maintain low wages and to secure large federal agricultural subsidies for large plantations. The Southern landowners ensured that the unemployment insurance component of the 1935 Social Security Act excluded farm workers and that public assistance programs were administered by the states rather than the federal government.

Alston and Ferrie (1993) note further that farm mechanization in the 1950's significantly reduced the need for plantation workers and that it was increasingly in the interest of Southern landowners to promote the out-migration of blacks to Northern states. Thus, commenting on the Economic Opportunity Act, which was the centerpiece of the Johnson Administration's War on Poverty, Alston and Ferrie (1993: 868-9) write:

Given the essentially static power position of Southerners in the House and their increased power in

the Senate in the 1960's it is extremely unlikely that the welfare state programs of the 1960's could have emerged from Congress without the countenance of Southern congressmen. Not only did Southerners have the agenda control which committee power and their importance within the Democratic Party produced, but . . . both Kennedy and Johnson needed the Southern vote in order to pass welfare legislation.

Furthermore, by showing that it is in the best interest of the governing group, whenever possible, to create distinct transfer programs, targeted to group-specific risks, our approach provides a reason why the rise in social transfers after World War II may owe much to technical improvements in public administration. Thus, in our view, advances in record-keeping, especially automated data processing which originated during World War II, permitted extensions of social insurance to cover many more occupations and additional types of risks. An examination of the record-keeping history of the Social Security Administration in the U.S. corroborates our view. In 1956 the Social Security Administration installed the first large-scale computer to maintain records and in 1958 the Index was microfilmed.¹¹ Before then:

[T]he names were typed on flexible strips inserted in metal panels and hung on racks like pages in a book. With 119 names to a panel and 1,600 panels to a rack, the mammoth file took up a city block of floor space. It was growing at the rate of about 3 million names a year and required 6,000 additional square feet of space every 12 months.¹²

An integrated data processing system was put into effect in 1965. This record of adoption of new methods is strongly suggestive that the welfare state could not have expanded in the same way prior to World War II, nor after the 1970s, since by then the basic, necessary record-keeping technology was already in place. To our knowledge, this technical change explanation for the

¹¹Microfiche is a German invention of the 1940s.

¹²*SSA History: Social Security U.S.A.—The Program & Its Administration*, <http://www.socialsecurity.gov>.

increase in transfers during the 20th century has not been adequately emphasized.

In addition to technical change, both social coordination and aggregate uncertainty appear to have played a role in explaining the growth of the welfare state after World War II. For instance, Domhoff (1990) has argued that the Vietnam War served as a coordination device to mobilize distinct social groups. By showing how the ability of non-governing groups to coordinate their social demands determines the extent of redistribution, our argument sheds light on the role of the increasing demands of disparate social groups that culminated in the mass protests and riots of the 1960s.

3 The Static Model of Social Transfers

We begin with a simple model where the governing group plays a one-shot game with just a single non-governing group. The analysis will provide some basic insights on risk-sharing, facilitating an understanding of the model in Section 4, where there is repeated interaction between the governing group and multiple non-governing groups.

Suppose that society consists of two groups, indexed by $i = A, B$. Group A has a continuum of agents with mass 1. The relative size of group B is $n > 0$. Agents belonging to the same group are endowed with identical incomes. Group i 's per capita income $y_i > 0$ is the realization of a random variable, for $i = A, B$. The income distribution is given by the joint cumulative distribution $F(y_A, y_B)$. Group A is the *governing group*. By that we mean that it has the power to choose transfers T . We assume that transfers are conditional on income realizations (y_A, y_B) .

We adopt the convention that $T(y_A, y_B) > 0$ denotes a transfer from group B towards group A ; when $T(y_A, y_B) < 0$ the transfer goes towards group B . In this section, we use the word *transfer* generically to denote any net income flowing between groups. In Section 5, we examine these transfers. Transfers from group B to group A in the real world can literally be payments

from the government to group A or may capture spending on public goods that are primarily of benefit to group A . Public goods will be introduced explicitly in Section 6.

Group's A power is only limited by the fact that group B can choose to opt out of the social contract, in which case each individual in group B earns an outside option u_B , while imposing an outside option u_A on each individual in group A . Outside options are measured in utility terms. Group A commits to a system of transfers and group B simultaneously decides whether or not to opt out, before the realization of the income shocks is observed. We implicitly assume that mechanisms exist to coordinate the decisions of individuals within each group. Individuals in both groups are risk averse, with a CRRA utility $u(z) = z^\theta/\theta$ with $\theta < 1$ and $\theta \neq 0$.

To ensure that there is a feasible contract which is individually rational for both groups, we assume that¹³

$$E \left[u \left(\frac{y_A + ny_B}{1+n} \right) \right] \geq \frac{u_A + nu_B}{1+n}. \quad (3.1)$$

3.1 Equilibrium Social Contract

There are two pure-strategy Nash equilibria. In the first one, the non-governing group opts out and the governing group sets transfers so the non-governing group would get less than u_B if they were to be part of the social contract. In the second equilibrium, group B does not opt out and group A 's choice of social transfers solves the problem

$$\max_{T(y_A, y_B)} E \left[u \left(y_A + T(y_A, y_B) \right) \right] \quad (3.2)$$

¹³To ensure that there is a feasible contract which is individually rational for both groups, it must be that there is a number $c \in [0, 1]$ such that

$$E [u(c(y_A + ny_B))] + nE \left[u \left(\frac{(1-c)(y_A + ny_B)}{n} \right) \right] \geq u_A + nu_B.$$

Equation (3.1) follows from noting that the left side of this inequality is maximized at $c = 1/(1+n)$.

subject to

$$\begin{aligned} E \left[u \left(y_B - \frac{T(y_A, y_B)}{n} \right) \right] &\geq u_B, \\ E \left[u \left(y_A + T(y_A, y_B) \right) \right] &\geq u_A. \end{aligned}$$

Equilibrium social transfers are characterized by three conditions. First, if group B chooses not to opt out, then the expected utility of each of its members is brought all the way down to their outside option u_B :

$$E \left[u \left(y_B - \frac{T(y_A, y_B)}{n} \right) \right] = u_B. \quad (3.3)$$

Second, it must be in the interest of group A not to force group B out. That is, group A 's participation constraint must hold. Third, an interior solution to problem (3.2) must be such that group A transfers utility from group B towards themselves at a constant rate. That is,

$$\frac{u' \left(y_A + T(y_A, y_B) \right)}{u' \left(y_B - \frac{T(y_A, y_B)}{n} \right)} = \frac{\lambda}{n}, \quad (3.4)$$

for all realizations (y_A, y_B) , where λ is the Lagrange multiplier for group B 's participation constraint, with $\lambda > 0$ if group B is not to opt out. Thus, the governing group trades-off, state by state, the marginal benefit from taking additional income from group B and the marginal cost of doing so, which in turn depends on the value that group B places on additional income in a given state.

It will be convenient to think of post-transfer income shares, rather than actual transfers.

Definition 1. Let $\alpha(y_A, y_B) \equiv \frac{y_A + T(y_A, y_B)}{y_A + ny_B}$. A social contract is a distribution of post-transfer national income $\left\{ \alpha(y_A, y_B), 1 - \alpha(y_A, y_B) \right\}$.

Proposition 1. There exists an equilibrium where group B opts out. Whenever (3.1) is satisfied, there also exists an equilibrium social contract $\left\{ \alpha^*, 1 - \alpha^* \right\}$, where $\alpha(y_A, y_B) = \alpha^*$, for all income realizations (y_A, y_B) , and α^* is the unique solution to

$$E \left[u \left(\frac{(1 - \alpha^*) (y_A + ny_B)}{n} \right) \right] = u_B.$$

Thus, an equilibrium social contract involves each group getting a constant share of aggregate income, independently of the income realizations. This property follows from (3.3), which indicates that group A extracts all the social surplus, together with the form of the utility function, which assumes that individuals have constant relative risk aversion.¹⁴ Other properties of the non-trivial social contract in the absence of aggregate uncertainty are summarized in the next proposition.

Proposition 2. *Suppose that there is no aggregate uncertainty, and let $y_A + ny_B = (1 + n)y$, for all (y_A, y_B) , for fixed y . Then, the share of group A in aggregate income, α^* , rises with average income y , and decreases with the relative size of group B , n , with the common coefficient of risk aversion, $1 - \theta$, and with the conflict payoff of group B 's individuals, u_B .*

The intuition for these properties rests on the fact that individuals in group B are optimally expropriated. An increase in per capita income allows group A to get more for themselves while still giving members of group B their outside option. An increase in the relative size of group B , for fixed per capita income, requires group A to lower their income share in order to meet the participation constraint of each individual in group B . The effect of an increase in u_B is also straightforward, as group A must give group B enough for them to remain in the contract. An increase in both groups' risk aversion implies that it is more expensive to expropriate group B which results in an increase in group B 's share of aggregate income.

The effect of aggregate uncertainty on the social contract is more interesting.¹⁵

Proposition 3. *(i) The share of the governing group in aggregate income (α^*) is relatively larger when aggregate income is stochastically larger—in the sense of first-order stochastic dominance. (ii) However,*

¹⁴For instance, if individuals had decreasing relative risk aversion, one can verify that $\alpha(y_A, y_B)$ would increase with $y_A + ny_B$ if $u_A > u_B$, since then $\alpha(y_A, y_B) > (1 - \alpha(y_A, y_B))/n$, for all (y_A, y_B) . Note, however, that α would still depend on (y_A, y_B) only through $y_A + ny_B$.

¹⁵Note that the random variable $y = y_A + ny_B$ is completely characterized by the joint distribution of y_A and y_B .

α^* decreases with aggregate income risk—measured as a mean-preserving spread in the distribution of aggregate income.

Part (i) implies that the non-governing group's share of national income is smaller in a society where aggregate income tends to be higher. This is explained by the fact that the agents in the non-governing group are brought down to their outside option for all values of national income, with group *A* enjoying all the surplus. Part (ii) implies that, starting from a situation where the governed are optimally expropriated, an increase in aggregate risk is fully absorbed by the governing group, therefore resulting in redistribution towards the non-governing group.

As an example, suppose that each group's per capita income, y_A and y_B , respectively, are independently normally distributed with means μ_A and μ_B and variances Σ_A and Σ_B , respectively. Then, aggregate income, $y_A + ny_B$, is a normal random variable with mean $\mu_A + n\mu_B$ and variance $\Sigma_A + n^2\Sigma_B$. Disregard the fact that incomes can be sometimes negative in this example. Proposition 3 then indicates that the non-governing group's share of national income, $1 - \alpha^*$, is higher when μ_A or μ_B are lower or when Σ_A or Σ_B are higher. Note that both an increase in Σ_A and a decrease in μ_A induce redistribution towards group *B*, away from group *A*. This example captures sharply the distinct logic of our theory, by showing how redistribution can be in the self-interest of the governing group, despite superficial evidence to the contrary. In Section 2 we argued that this logic can shed light on the role of the Great Depression in the timing of the 1935 Social Security Act in the United States, by explaining why those with political power benefited from the Act. According to our argument, the social programs introduced by the Act were the governing group's optimal response to the fact that increased aggregate risk made the participation constraint of some of the non-governing groups harder to meet.

4 The Welfare State as a Self-enforcing Social Contract

4.1 Social Contract

So far we have considered the social contract as the result of a one-time interaction between the governing and a non-governing group. Consequently, the non-governing group cannot extract any surplus. However, it is important to note that the point that we wish to make is *not* that the welfare state is simply the reflection of the optimal expropriation of the non-governing groups by a governing elite. Surely a limit to such a process of expropriation is that it would seriously harm the private incentive to create wealth. As already mentioned, we abstract away from this sort of incentive effects to focus on an array of distributional issues that underlie, in our view, the welfare state and that are not addressed by conventional theories.

We propose a fundamentally different reason why social groups which do not have the power to control social transfers directly can nevertheless benefit from the welfare state. This reason is the repeated interaction among social groups, which enables the enforcement of mutually beneficial social contracts that distribute incomes between those with the power to choose taxes and transfers—the governing group—and those with the power to generate social conflict—the non-governing groups. The view that will emerge from the following analysis is that the welfare state's role is to exploit the *efficiency gains* from social insurance, while mediated by distributional conflict between social groups. Furthermore, the extent of redistribution and thus, the post-transfer distribution of income, depends on society's specification of expected behavior, together with rules to punish deviations from such an expected behavior. This argument, while being a straightforward application of the theory of repeated games, can explain why social groups are not necessarily brought to the verge of having to resort to social unrest. It also suggests that the ability of non-governing groups to coordinate their social demands plays a central role in determining the post-fisc distribution of income.

To explore these ideas we extend the model to allow for the possibility that the interaction between the governing and the non-governing group is complicated by the heterogeneity of social groups within the non-governing group. In practice, group identity can be a function of race, gender, age, geographical location, etc. Affirmative action, pay equity, pensions, and agricultural subsidies are examples of the sort of income transfers which are relevant in each one of these cases.

As before group A has size 1 and each individual in the group is endowed with income $y_A > 0$. Group B has size n . Now suppose that group B consists of $N \geq 1$ distinct groups of identical size. The distribution of incomes is a random draw from $F(y_A, y_1, \dots, y_N)$ every period, where $y_i > 0$ denotes group i 's per capita income. Suppose, furthermore, that group A has access to group-specific transfers. Thus, a schedule of transfers can be now made conditional on income realizations and also conditional on the identity of the non-governing groups.

Given our analysis so far, it will be useful to think about group A as choosing a social contract $\{\alpha_A, \alpha_1, \dots, \alpha_N\}$ in the stage game, where α_i denotes group i 's post-transfer income share. The subgroups of B can each choose independently to participate in the social contract, or to opt out. Let u_B be the common conflict payoff to all non-governing groups. For simplicity we set the conflict payoffs of all agents to zero, that is, $u_A = u_B = 0$, and in order to ensure that there are any gains from trade we restrict the coefficient of risk aversion $(1 - \theta)$ to be less than unity. Assuming that $u_A = u_B = 0$ and $\theta > 0$ ensures that there are social gains from including *every* group in the social contract, without changing the essence of our problem.

In the interest of clarity, we restrict attention to equilibria in pure strategies, which map possible period- t histories to non-mixed actions. The play of the game describes the profile of actions $\{\alpha_A^t, \alpha_1^t, \dots, \alpha_N^t, x_1^t, \dots, x_N^t\}$ that is played every period $t = 0, 1, 2, \dots$, where $\{\alpha_A^t, \alpha_1^t, \dots, \alpha_N^t\}$ indicates the social contract chosen by group A in period t and, for each $i = 1, \dots, N$, $x_i^t = 0, 1$ indicates the action of group i in period t ; let $x_i^t = 0$ indicate that

group i opts out of the social contract in period t . A strategy for group A is a sequence of social contracts. A strategy for group i is a sequence of participation decisions.

All agents discount the future using the common discount factor $\delta < 1$. Group A seeks to maximize the normalized expected payoff

$$v_A = (1 - \delta) \sum_{t=0}^{\infty} \delta^t X^t E \left[u \left(\alpha_A^t \left(y_A + (n/N) \sum_{i=1}^N x_i^t y_i \right) \right) \right], \quad (4.1)$$

where $X^t = 0$ if $\sum_{i=1}^N x_i^t = 0$ and $X^t = 1$ otherwise. Each agent in non-governing group j maximizes

$$v_j = (1 - \delta) \sum_{t=0}^{\infty} \delta^t x_j^t E \left[u \left(\frac{\alpha_j^t \left(y_A + (n/N) \sum_{i=1}^N x_i^t y_i \right)}{n/N} \right) \right], \quad (4.2)$$

for all $j \in \{1, \dots, N\}$, respectively. These payoffs reflect the relative power of each group in society. The governing group can always choose to set $\alpha_A = 1$ and $\alpha_i = 0$ for all $i \in \{1, \dots, N\}$ and thus, extract all the surplus from the social contract.

Each non-governing group j derives some power from its ability to opt out of the contract, because group A loses access to the group's income. Furthermore, the non-governing groups have the power to opt out simultaneously, in principle, in which case group A 's payoff is $v_A = 0$. More generally, the model captures the idea that social groups can hurt group A relatively more when they are able to coordinate their opting out decisions. In the interest of clarity, we have ignored the possibility that the opting out of some groups may hurt the before-transfer incomes of the groups remaining in the social contract. Allowing for the possibility that the income endowments of each group depend on the opting out of other groups would not change the substance of our analysis.

For simplicity we will focus on stationary plays and thus, omit all time superscripts from here on. Each play defines an expected payoff for each agent in each group, $\{v_A, v_1, \dots, v_N\}$. The set of feasible payoffs is determined by the aggregate expected incomes associated with each possible play. Note that group A chooses a schedule of transfers, or equivalently a social

contract, which specifies the post-transfer income distribution for all income realizations. Thus, a deviation by group A in the present context is a deviation from the contract that applies to all income realizations. We assume that all deviations from the equilibrium play are observable.

Analysis of this repeated game is straightforward. Note that there is a Nash equilibrium of the stage game that holds all agents to their minmax payoffs, that is, the lowest payoffs that all other groups can jointly impose on each single group given that the latter responds optimally. In this equilibrium, group A chooses $\alpha_A = 1$ and $\alpha_i = 0$ for all $i \in \{1, \dots, N\}$ and all non-governing groups opt out, that is, $X = \sum_{i=1}^N x_i = 0$.

A folk theorem applies in the present context.¹⁶ That is, any feasible payoffs $v_A > 0$ and $v_i > 0$, for all $i \in \{1, \dots, N\}$, can be enforced by a subgame perfect equilibrium if δ is sufficiently high. The relevance of the folk theorem in the present context lies in that it indicates that the non-governing groups can get some of the surplus from the social contract, even though the contract is controlled by the governing group. The general insight is that informal enforcement mechanisms can play an important role in the redistribution of income.

It is useful to consider the set of all post-transfer distributions of income that can be enforced by a subgame perfect equilibrium, for a given discount factor. Consider the following strategy profile. Group A chooses the social contract $\{\alpha_A, \alpha_1, \dots, \alpha_N\}$ if no one has deviated in the past, and otherwise, chooses $\alpha_A = 1$ and $\alpha_i = 0$ for all $i \in \{1, \dots, N\}$. Group i opts out if and only if someone has deviated in the past, for all $i \in \{1, \dots, N\}$. These strategies require the sanction for any deviation to be a switch to the Nash equilibrium in which all agents are minmaxed forever after. Since this is the worst subgame perfect equilibrium for all agents, any payoffs that can be enforced by some subgame perfect equilibrium can be enforced by the minmax strategies. Note that any (efficient) equilibrium contract $\{\alpha_A, \alpha_1, \dots, \alpha_N\}$ has associated payoffs for each

¹⁶See Fudenberg and Maskin (1986).

of the non-governing groups:

$$v_i = E \left[u \left(\frac{\alpha_i \left(y_A + (n/N) \sum_{i=1}^N y_i \right)}{n/N} \right) \right] \geq 0. \quad (4.3)$$

The following result is straightforward.

Proposition 4. *Let $u_A = u_B = 0$ and $\theta \in (0, 1)$. For any fixed discount factor $\delta < 1$, the set of all post-transfer income shares of group A that are part of an efficient social contract and can be enforced by a subgame perfect equilibrium is given by $[\underline{\alpha}_A(\delta), 1]$, where $\underline{\alpha}_A(\delta)$ solves*

$$E \left[u \left(\underline{\alpha}_A(\delta) \left(y_A + (n/N) \sum_{i=1}^N y_i \right) \right) \right] = (1 - \delta) E \left[u \left(y_A + (n/N) \sum_{i=1}^N y_i \right) \right],$$

and $\underline{\alpha}_A(\delta)$ decreases with δ , approaching 0 as $\delta \rightarrow 1$ and approaching 1 as $\delta \rightarrow 0$.

The left side of the equality in the proposition is the value to agents of group A of remaining in the social contract. The right side is the value of deviating from the contract for one period and obtaining their conflict payoff $u_A = 0$ forever after. Note that given the strategies of all groups, group A's optimal deviation is to appropriate all income. The minimum payoff that agents in group A are willing to tolerate before they wish to deviate from the contract is that which makes these values exactly equal. The governing group is strictly better off in the social contract, since there are strictly positive gains from cooperation. Consequently, any (efficient) post-transfer income distribution with $\sum_{i=1}^N \alpha_i \in [0, 1 - \underline{\alpha}_A(\delta)]$ can be enforced by a subgame perfect equilibrium. Note that $1 - \underline{\alpha}_A(\delta)$ measures the limit to the joint surplus that the non-governing groups can obtain in any subgame perfect equilibrium. It is well understood that subgame perfection does not pin down the play of the game in repeated games with patient agents. Nonetheless, Proposition 4 provides a framework in which one can anchor a useful discussion of some key features of the welfare state.

The main purpose of Proposition 4 is to illustrate the scope for redistribution from the governing group towards the non-governing groups, which arises from cooperation. We return to

this issue below. Before then, however, the role of social insurance is worth emphasizing. First, the optimal exploitation of all the gains from trade by the governing group does involve risk sharing and thus, the underlying equilibrium transfers will reflect the provision of social insurance. Second, as a practical matter, the provision of social insurance is a conspicuous feature of the welfare state, which suggests that gains from risk sharing are indeed being exploited.

The potential effects of aggregate uncertainty are worth reconsidering in the repeated version of the static game analyzed above. Suppose that there is a social contract $\{\alpha_A, \alpha_1, \dots, \alpha_N\}$, with corresponding payoffs $\{v_A, v_1, \dots, v_N\}$. Now consider a mean preserving spread in the distribution of aggregate income $y_A + (n/N) \sum_{i=1}^N y_i$. As shown previously in the discussion of the static game, for fixed payoffs the effect of such a change in risk is a change in the social contract (i.e. the α_i 's), to induce redistribution from the governing group to the non-governing groups. Alternatively, in the repeated game, a change in aggregate uncertainty could lower the payoffs of the non-governing groups (i.e. the v_i 's) while holding the post-transfer income distribution fixed. This second possibility may provide a context in which to place what Hacker (2004) refers to as "the hidden politics of the U.S. social policy retrenchment" in the past three decades, characterized by active campaigns to block legislation that might protect citizens from new and increasing risks. While coverage of the poor has grown, Hacker argues, the dominant issue has been the failure to pass any proposal for expanded health coverage, despite declining private coverage, culminating with the defeat of the Clinton health plan. The important point is that the first-order issue may not be whether or not existing social protection programs have resisted pressures to cut back transfers, but rather that failure of the government to respond to increasing and changing risks appear to have resulted in a significant decline of protection, both public and private.

To reiterate, whereas our model does not pin down a one-to-one mapping between income inequality, redistribution and social insurance, we think that it offers a useful interpretation of

key episodes in the history of the welfare state, as argued in Section 2. As discussed next, such a background is one in which the degree of social coordination and the ability of the governing group to prevent such coordination can play a critical role.

4.2 Social Consensus

The most desirable contracts for the non-governing groups, that is, those where $\sum_{i=1}^N \alpha_i = 1 - \underline{\alpha}_A(\delta)$, can only be enforced by a strategy profile where *all* groups opt out and thus, punish group *A* whenever *any* non-governing group opts out and, furthermore, to continue to opt out forever after. These actions by the non-governing groups correspond closely to the possibility that non-governing groups are able to *coordinate* their social demands (that is, their v_i 's) by threatening group *A* with their joint opting out unless they *all* extract payoffs $\{v_1, \dots, v_N\}$ from the social contract. This requires not only that the non-governing groups threaten collective actions, but also that there is social consensus on that which is expected of the governing group. This social consensus is not automatic. It requires substantial coordination among the non-governing groups. Since electoral promises as well as laws can be broken and institutions governing public policy making can be changed, something else is needed in order to limit the power of the governing group. Social consensus on the limits on the governing group is then critical not only for social peace, but also for the redistributive effect of the welfare state. Thus, our model suggests that more redistributive welfare states result when the members of the non-governing groups can overcome their coordination problems and agree to place larger demands on the state. The self-enforcing nature of the social contract then compels the governing group to take into account those social demands and choose either to respect them or to embrace social conflict.¹⁷

¹⁷Weingast (1997) has similarly emphasized the role of social consensus for democratic stability and the rule of law.

There is a range of payoffs which can be enforced by using the Nash-threat that minmaxes all agents, but cannot be enforced by the threat of some, but not all groups opting out. In particular, an alternative reputation mechanism is one where all agents respond to any deviation by switching to the play under any of the subgame perfect equilibria involving the exclusion of some, but not all, of the non-governing groups. Such sanctions constitute a subgame perfect equilibrium. It can be verified that the following strategy profile can enforce the set of all equilibrium social contracts where m groups opt out, with $1 \leq m \leq N - 1$, for any given discount factor. Let $J \subset \{1, \dots, N\}$ be the subset of all groups that opt out in the proposed equilibrium. Group A chooses the contract $\{\alpha_A, \alpha_1, \dots, \alpha_N\}$, with $\alpha_j = 0$ for all $j \in J$, if no one has deviated in the past and otherwise, chooses $\alpha_A = 1$ and $\alpha_i = 0$ for all $i \in \{1, \dots, N\}$. Group j opts out every period, for all $j \in J$. Group i opts out if and only if someone has deviated in the past, for all $i \notin J$.

Recently, there is much concern with the phenomenon of *social exclusion*, although its precise meaning and scope are unclear. Atkinson (1998) has emphasized the importance of including social groups in the welfare state. Our analysis formalizes some of what may be involved here. The key feature of exclusion in the present context is that opting out of the social contract becomes an equilibrium outcome. The decision by Group A to minmax one of the non-governing groups and the decision of such a group to opt out of the social contract become self-enforcing, leaving efficiency gains unexploited.¹⁸

The enforcement mechanisms that we have discussed rely on the threat of at least one group opting out of the social contract. This is an inefficient punishment. In the present context, the

¹⁸We have noted that social conflict can occur along the main equilibrium path. Alternatively, it could emerge as a result of small mistakes which cause a punishment phase in the repeated game. Furthermore, note that we have focused on pure strategies, but short periods of conflict may also arise as the result of the non-governing groups using mixed strategies.

demand by non-governing groups for a larger share of national income is not credible on its own, unless it is backed by the threat of conflict. Note that it is well understood in the theory of repeated games that Pareto inefficient punishments would be subject to renegotiation if they were to take place.¹⁹ As an example, consider the possibility that mutually profitable *bilateral* agreements between group *A* and individual social groups can be reached even during the punishment phase. Clearly, group *A* has an incentive to buy off each non-governing group and similarly, each non-governing group is willing to stay in the contract in exchange for some surplus. Hence, whenever such bilateral agreements are feasible, group *A* will exploit all the gains from trade. This is in contrast with the coordinated threat discussed above, where all non-governing groups coordinate to reach a *multilateral* agreement and exploit all the gains from trade among themselves.

The point is not that the social contract in which the governing group minmaxes the non-governing groups is the only reasonable contract. Quite the opposite, our emphasis is precisely that the inefficiency of social unrest makes it a powerful threat. Indeed, the history of the welfare state suggests that the inefficient threat of conflict is empirically plausible.²⁰ In general, different situations involve the possibility that the governing group can reach bilateral agreements with some, but not all non-governing groups. Although we do not attempt to resolve the issue of equilibrium selection here, history supports the view that external threats have often served as a coordination device to mobilize distinct social groups. For instance, Domhoff (1990) has argued that the Vietnam War had this effect, whereas in the decade after the war, solidarity between social movements tended to break down.

¹⁹See e.g. Farrell and Maskin (1989) and Bernheim and Ray (1989).

²⁰Schram and Turbett (1983) document the positive relationship between the number of families receiving social welfare from 1969 to 1972 in each U.S. state and an index of riots in each state in the preceding three years 1965–1968.

5 Structure of Social Transfers

So far we have analyzed the social contract in terms of the post-transfer distribution of income. Our maintained assumption that the governing group has the ability to make transfers conditional on all income realizations as well as on group identity has allowed us to understand important features of the social contract without keeping track of the underlying, complex flows of transfers. Now we illustrate how the model can give further insight into the structure of social transfers. We organize our discussion around the next proposition, which follows from our previous results on the post-transfer income distribution, together with the definition of transfers.

Proposition 5. *Let $u_A = u_B = 0$ and $\theta \in (0,1)$. Consider an equilibrium social contract in which N non-governing groups participate and their social demands are given by $\{v_1, \dots, v_N\}$. Then, social transfers are given by*

$$\frac{T_i}{n/N} = y_i - \frac{\alpha_i y}{n/N} = y_i - y \left[\frac{v_i}{E[u(y)]} \right]^{\frac{1}{\theta}},$$

where $y = y_A + (n/N) \sum_{i=1}^N y_i$, for all $\{y_A, y_1, \dots, y_N\}$, and for all $i = 1, \dots, N$.

Thus, for given demands v_i , members of group i will face smaller transfers — that is, make less payments ($T_i > 0$) or receive more benefits ($T_i < 0$) — when their incomes are relatively lower than average incomes. This provision of social insurance as state-dependent redistribution suggest two straightforward, but relevant, implications. First, from the viewpoint of a single non-governing group over time, equilibrium transfers can be viewed as partly self-financed, as each individual will face larger payments when his income is higher and larger benefits when his income is relatively lower. Second, from the viewpoint of the cross-section of individuals in the non-governing group at a point in time, state-dependent redistribution takes the form of redistribution from the wealthy to the poor. Indeed, the main rationale of the

welfare state, according to our theory, is to exploit the gains from social insurance through risk sharing across social groups.

Consider the implications of Proposition 5 for the mean and the variance of the distribution of social transfers. First, average group i 's transfers are given by

$$E\left(\frac{T_i}{n/N}\right) = E(y_i) - E(y) \left[\frac{v_i}{E[u(y)]} \right]^{\frac{1}{\theta}}. \quad (5.1)$$

On average, relatively poorer groups of individuals (those with lower $E(y_i)$) tend to be net recipients of social transfers, whereas relatively wealthier groups tend to be net payers. This is an important feature of actual welfare states. However, from the viewpoint of our theory it is explained neither by the altruism of the government nor by the direct political influence of a relatively poor electorate on social policy. Rather, this is because the optimal exploitation of the gains from social insurance, by the governing group, calls for redistribution from high income states to low income states.

Second, while group i 's post-transfer income is a function of aggregate risk alone, Proposition 5 indicates that the underlying transfers are a function of group i 's idiosyncratic risk, aggregate risk and the relationship between the two. Thus,

$$Var\left(\frac{T_i}{n/N}\right) = Var(y_i) + \left[\frac{\alpha_i}{n/N}\right]^2 Var(y) - 2 \left[\frac{\alpha_i}{n/N}\right] Cov(y_i, y), \quad (5.2)$$

and therefore, the variance of group i 's transfers increases with the variance of group i 's income and with the variance of aggregate income, and decreases as the covariance between group i 's income and aggregate income rises. As a special case, suppose that there is no aggregate uncertainty, that is, $y_A + (n/N) \sum_{i=1}^N y_i = \bar{y}$ for all $\{y_A, y_1, \dots, y_N\}$. Then, for each $i = 1, \dots, N$,

$$\frac{T_i}{n/N} = y_i - [\theta v_i]^{\frac{1}{\theta}}, \quad (5.3)$$

in which case group i 's transfers are designed solely to cope with group i 's specific risk, taking into account group i 's social demands, as given by v_i .

Our model, on the one hand, does not pin down the size of the welfare state, as it focuses on net transfers, without making the difference between taxes and spending explicit. On the other hand, it suggests a view of the size of the welfare state in terms of the number and complexity of social transfer programs. This view is implied by the following corollary of Proposition 5.

Corollary 1. *Whenever feasible, it is in the best interest of the governing group to design distinct group-specific transfer schedules, each restricting eligibility to individuals who face common income risks.*

To appreciate the broader implications of the previous corollary for the welfare state, note that our analysis rests on the assumption that the governing group is able to condition transfers on income realizations as well as on group identity. More generally, the governing group may not have enough instruments to achieve this outcome, which is a source of inefficiency. For instance, the U.S. welfare state began with simple transfer programs consisting of lump-sum transfers to the old, food relief, etc. The growth of the welfare state since then has consisted of an enlargement of insurable events characterized by the increasing number and complexity of transfer programs as well as the narrowing targeting of each program. With respect to this, our model suggests a view of the growth of the welfare state as being driven by the lifting of technical constraints faced by the public administration.

First, the governing group may not be able to condition transfers on income realizations, but only on readily observable group characteristics, such as race, gender, union membership or old age, which can serve as proxies for socio-economic groups of individuals with similar risk characteristics and social demands. This situation may be viewed as constraining transfers to certain groups of individuals to lump-sum amounts conditional on group identity alone. This type of transfer, however, prevents the governing group from exploiting the gains from social insurance and it is, therefore, suboptimal.

Second, the governing group may not be able to condition transfers on group identity, thus

losing its ability to target group-specific risk. Formally this can be viewed as a situation where the governing group solves the problem analyzed above, subject to a set of additional constraints. For instance, consider the case where there are two non-governing groups of individuals facing distinct risks. Now suppose that the governing group can still condition transfers on all income realizations, but it faces the technical constraint that it must offer the same transfer schedule to both groups. The corresponding equilibrium transfer schedule solves the above problem subject to the additional constraint that $T_1(y_A, y, y') = T_2(y_A, y', y)$, for all (y_A, y_1, y_2) . Although solving this problem is more complicated than solving the unconstrained problem, it is easy to verify that the additional constraints limit the ability of the governing group to exploit the gains from social insurance, which in general precludes the possibility of full risk sharing. The important implication is that the governing group must be, in general, better off when these constraints are lifted. As discussed in Section 2, this argument helps understanding the role of improvements in record keeping and public administration in the growth of the welfare state.

Finally, there is the question of what these transfers are exactly. In practice, the welfare state is pro-poor in the sense that the poor are on average net beneficiaries of transfers while the rich are on average net payers. In this context, a reduction in redistribution shows up as a reduction in the transfers towards the non-governing groups, rather than a flow of money towards the governing group. For some states, actual transfers from the non-governing to the governing groups can take the form of business subsidies, agricultural subsidies, reductions in taxes etc.. In addition, redistribution of incomes between the governing and the non-governing groups may take the form of changes in the provision of public goods, rather than changes in transfers. We address the distinction between transfers and public goods in the next section.

6 An Extension: Social Insurance and Public Goods

Governments are not engaged solely in the provision of social transfers; taxes are also used to finance spending on goods and services, such as public schooling, national defense, and infrastructure. In order to understand the possible interaction between different types of expenditures, we now extend our previous model to allow for a public good. The difference between public goods and the lump-sum transfers that we have considered so far is that individuals from different groups cannot be excluded from consuming the public good.

For simplicity, consider the case where the non-governing group is homogenous. That is, suppose that there is one governing and one non-governing group. Continue to normalize all conflict payoffs to zero, that is, $u_A = u_B = 0$, and consider an equilibrium social contract with associated payoffs $v_A > 0$ and $v_B > 0$, keeping in mind that there is a subgame perfect equilibrium which enforces these payoffs if the discount factor is sufficiently high.

Assume that agents are risk averse and they have preferences over consumption, just as before. The only difference is that now they value a consumption bundle including private consumption as well as a public good. It will be convenient to write utilities as a function of post-transfer incomes and the public good separately. Let z_i be the post-transfer income of an agent in group i — with $z_A = y_A + T_A$ and $z_B = y_B - T_B/n$, respectively — and let g be the amount of the public good. Further, let $u^i(z_i, g)$ be the utility of an agent of group i when he has post-fisc income z_i and the amount of the public good is g . We assume that the consumption bundle is homogeneous of degree one in g and z_i and, for concreteness, we continue to assume that utility is CRRA in the consumption bundle, that is,

$$u^i(z_i, g) = \frac{\left(z_i \phi_i \left(\frac{g}{z_i}\right)\right)^\theta}{\theta}, \quad \theta \in (0, 1), \quad (6.1)$$

for $i = A, B$. The consumption bundle is given by $z_i \phi_i \left(\frac{g}{z_i}\right)$, with $\phi_i' > 0$ and $\phi_i'' < 0$. Our main results below will be illustrated for the special case where the consumption bundle is

Cobb-Douglas, so that

$$\phi_i \left(\frac{g}{z_i} \right) = \left(\frac{g}{z_i} \right)^{\gamma_i}, \quad 0 < \gamma_i < 1, \quad (6.2)$$

where γ_i is the elasticity of the consumption bundle c_i with respect to the public good g . If $\gamma_i = \gamma$ for the governing and the non-governing groups, we have a general public good. Otherwise, $\gamma_A - \gamma_B$ reflects a degree of specificity of the public good.

A preliminary question is whether the supply of public goods is better understood as being made conditional on all income realizations or just on aggregate income. On the one hand, the assumption that public good provision is not made conditional on the entire income distribution is perhaps the most natural, given that the governing group already has access to transfers conditional on income realizations. On the other hand, it is not immediately obvious, in theory or in practice, whether or not the governing group prefers to condition the supply of public goods on the actual income distribution as well as aggregate income, at least for some realizations of the income distribution. It turns out that in the present context the governing group chooses to make the supply of the public good conditional on aggregate income alone, even if conditioning its supply on the entire income distribution is feasible.

Consider an equilibrium where group B demands expected utility $v_B > 0$. Group A chooses the transfer it receives, $T_A(y_A, y_B)$, the transfer the non-governing group pays, $T_B(y_A, y_B)$, and the level of public goods $g(y_A, y_B)$. Suppose that the governing group can solve its problem state by state, as if the public good could be made conditional on all income realizations. The solution to this problem is intuitive and it will make clear that restricting the public good to depend only on aggregate income leaves the social contract unchanged.

Formally, the governing group chooses $T_A(y_A, y_B)$, $T_B(y_A, y_B)$ and $g(y_A, y_B)$ to solve

$$\max E \left[u^A \left(y_A + T_A(y_A, y_B), g(y_A, y_B) \right) \right] \quad (6.3)$$

subject to a participation constraint for the governing group,

$$E \left[u^A \left(y_A + T_A(y_A, y_B), g(y_A, y_B) \right) \right] \geq v_A, \quad (6.4)$$

a participation constraint for the non-governing group,

$$E \left[u^B \left(y_B - \frac{T_B(y_A, y_B)}{n}, g(y_A, y_B) \right) \right] \geq v_B, \quad (6.5)$$

the fiscal budget constraint

$$T_B(y_A, y_B) - T_A(y_A, y_B) = g(y_A, y_B), \quad (6.6)$$

and the fact that public good provision must be non-negative,

$$g(y_A, y_B) \geq 0, \quad (6.7)$$

where we have assumed, for simplicity, that the marginal rate of transformation between private and public goods is equal to one.

Consider a non-trivial social contract, that is, a contract in which the non-governing group chooses to participate. Note that the amount of the public good must be positive in such a contract, since $v_A, v_B > 0$. Accordingly, it is convenient to ignore the non-negativity constraint (6.7), since it will never be binding.

First, group A transfers utility from group B at a constant rate across states of the world:

$$\frac{u_1^A \left(y_A + T_A(y_A, y_B), g(y_A, y_B) \right)}{u_1^B \left(y_B - \frac{T_B(y_A, y_B)}{n}, g(y_A, y_B) \right)} = \frac{\lambda}{n}, \quad (6.8)$$

for all (y_A, y_B) , where u_j^i denotes the derivative of u^i with respect to the j th argument, for $i = A, B$ $j = 1, 2$.

Second, public goods provision is *ex post* efficient in that it is such that the sum of the marginal rates of substitution between income and the public good, for all agents, equals the price of the public good. That is, for all (y_A, y_B) ,

$$\frac{u_2^A \left(y_A + T_A(y_A, y_B), g(y_A, y_B) \right)}{u_1^A \left(y_A + T_A(y_A, y_B), g(y_A, y_B) \right)} + n \left(\frac{u_2^B \left(y_B - \frac{T_B(y_A, y_B)}{n}, g(y_A, y_B) \right)}{u_1^B \left(y_B - \frac{T_B(y_A, y_B)}{n}, g(y_A, y_B) \right)} \right) = 1. \quad (6.9)$$

This is the well-known Samuelson rule for the efficient provision of a public good, which arises here as an *equilibrium* outcome.

Third, the members of the non-governing group are pushed to their participation constraint,

$$E \left[u^B \left(y_B - \frac{T_B(y_A, y_B)}{n}, g(y_A, y_B) \right) \right] = v_B. \quad (6.10)$$

Equations (6.8)–(6.10) completely characterize the equilibrium social contract. Expressing private consumption and public good expenditures as a fraction of national income, letting $\alpha(y_A, y_B)$ be the governing group's share of aggregate income and letting $\beta(y_A, y_B)$ be the non-governing group's share, we have

$$z_A = y_A + T_A(y_A, y_B) = \alpha(y_A, y_B) [y_A + ny_B], \quad (6.11)$$

$$z_B = y_B - \frac{T_B(y_A, y_B)}{n} = \frac{\beta(y_A, y_B) [y_A + ny_B]}{n}, \quad (6.12)$$

and

$$g(y_A, y_B) = [1 - \alpha(y_A, y_B) - \beta(y_A, y_B)] [y_A + ny_B]. \quad (6.13)$$

In the Appendix, we show that (6.8) and (6.9) together imply that the share of each group in the post-transfer income distribution is constant across income realizations. The fiscal budget constraint then implies that the public good $g(y_A, y_B)$ is also a constant fraction of aggregate income. Thus, the equilibrium social contract is such that

$$\left\{ \alpha(y_A, y_B), \beta(y_A, y_B), 1 - \alpha(y_A, y_B) - \beta(y_A, y_B) \right\} = \left\{ \alpha^*, \beta^*, 1 - \alpha^* - \beta^* \right\},$$

for all $\{y_A, y_B\}$. This implies that constraining the supply of the public good to be made conditional on aggregate income alone does not change the solution. We have the following.

Proposition 6. *Let $u_A = u_B = 0$. Consider an equilibrium social contract in which both groups participate and group B demands v_B . Then, the post-transfer distribution of income and the provision of*

the public good are determined as the unique solution $\{\alpha^*, \beta^*, 1 - \alpha^* - \beta^*\}$ to

$$1 - \alpha - \beta = \gamma_A + \left(\frac{\gamma_B - \gamma_A}{1 - \gamma_B} \right) \beta$$

and

$$E \left[\frac{\left(\frac{\beta}{n} (y_A + ny_B) \left(\frac{1 - \alpha - \beta}{\beta/n} \right)^{\gamma_B} \right)^\theta}{\theta} \right] = v_B.$$

For any $v_B > 0$, this social contract is such that $v_A > 0$ if and only if $\beta^* < 1 - \gamma_B$.

The social contract provides full risk sharing to the non-governing group even though it is dictated by the governing group in its self-interest. Furthermore, *ex post* efficient public good provision in the present equilibrium is achieved by neither a benevolent planner nor a competitive mechanism; rather, the present resource allocation mechanism is simply recognizing that the group with the power to implement policy has an incentive to generate an efficient provision of the public good as part of its individually rational extraction policy.

We have shown that allowing the provision of the public good to be made conditional on all income realizations would not change the equilibrium contract. To see why, first note that the fact that the governing group is assumed to have access to all necessary transfers to provide full risk sharing makes the use of the public good redundant for this purpose. Second, upon reflection, the reason why group-specific transfers dominate the public good as an insurance mechanism is that the public good is nonrivalrous and unexcludable. Consequently, it cannot cope with the heterogeneity of income risks across individuals.

The simplicity of the conditions stated in Proposition 6 rests on the fact that the consumption bundle is aggregated in Cobb-Douglas form, as in (6.2), in which case the elasticity of consumption with respect to the public good for each agent is the constant γ_i , for $i = A, B$. In this case one can easily understand how the post-transfer distribution of income and the provision of public goods respond to aggregate income risk and to the social demands of the non-governing group.

Proposition 7. *Let $u_A = u_B = 0$. (i) The share of the non-governing group in aggregate income (β^*) increases with the demands of the non-governing group, as given by v_B , and with aggregate income risk, measured as a mean-preserving spread in the distribution of aggregate income. (ii) As the share of the non-governing group in aggregate income (β^*) rises, the share of public goods in aggregate income ($1 - \alpha^* - \beta^*$) rises if the public good is specific to the non-governing group ($\gamma_B > \gamma_A$), remains constant if the public good is general ($\gamma_B = \gamma_A$), and falls if the public good is specific to the governing group ($\gamma_B < \gamma_A$).*

We have seen that the fact that public goods are nonrivalrous and unexcludable makes them inferior to social transfers as a tool to provide social insurance. Nevertheless, Proposition 7 establishes a relationship between public goods and social insurance, indicating that whether or not public good provision and post-transfer income inequality respond in the same direction to changes in aggregate uncertainty depends on the preferences of the governing and the non-governing groups for public goods.

7 Conclusion

Previous studies of the welfare state have taken for granted that those individuals who have the power to control social policy can commit not to use it solely in the interest of a governing group, to the exclusion of others in society. In this paper we have proposed a theory of the welfare state, in which the governing group is unable to commit not to expropriate non-governing groups, and the latter are unable to commit not to generate social conflict. Our theory is in sharp contrast with conventional explanations of the welfare state, which view social programs as either altruistic or designed specifically to give social protection to those with direct political influence.

We have formulated the view of the welfare state as a self-enforcing risk-sharing agreement

supplied by the governing group and designed to maximize their share of the social surplus. We have shown that the extent of inclusion in the resulting social contract and the extent of redistribution are determined by social consensus on the limits placed on the political power of the governing group. Such a social consensus is plagued with coordination problems. Consequently, more redistributive welfare states result when members of a society can overcome their coordination problems and agree to place larger social demands on the state. The self-enforcing nature of the social contract then compels the governing group to take into account those social demands and choose either to respect them or to embrace social conflict.

Our analysis has also revealed why a higher degree of aggregate risk can induce the governing group to supply social programs that are more redistributive. This is because it makes the participation constraint of the non-governing groups harder to meet. However, in order to exploit the potential gains from social insurance, the governing group needs to be able to use transfer programs that target group-specific risks separately. This suggests that the ability of the public administration to implement these group-specific transfer programs is key to the exploitation of the gains from social insurance. By addressing the roles of income risk and social consensus, and why the members of a governing group may find it in their self-interest to supply social programs, our theory can explain diverse features of the origin and the growth of the welfare state, such as the role of the Great Depression in the birth of the modern welfare state, and the role of social protest and technical improvements in record keeping and public administration in the rapid growth of the welfare state in the 1960s.

Our argument abstracts from the role commonly assigned to economic development and negative incentive effects in explaining the sources and the limits of the welfare state. In particular, we have abstracted from the fact that creating and administering taxes and transfer programs is costly. While acknowledging that the implementation of the welfare state requires sufficient economic development to finance social programs, we have shut down this effect

in order to illustrate the role of record-keeping in explaining why the golden age of the welfare state took place in the 1950s and 1960s. Further, this source of the growth of the welfare state also suggests its own limit, as the basic record-keeping technology was in place by the 1970s. This reflects a further contrast between our argument and the conventional view, which equates a larger welfare state with larger efficiency losses. Instead, we view the growth in the number and complexity of transfer programs as reflecting the exploitation of further efficiency gains.

Finally, we have argued that since public goods are nonrivalrous and unexcludable, they are inferior to narrowly targeted transfer programs in the provision of social insurance. However, when the governing and the non-governing groups have different preferences over public goods, the governing group has an incentive to use these public goods for redistributive purposes. Consequently, the supply of public goods responds to aggregate risk, and to the social demands of the non-governing groups. We have shown that the response depends on the relative preferences for the public good of the governing and the non-governing groups. An implication is that any retrenchment in social transfers would be accompanied by a reduction in public goods that are relatively more valuable to non-governing groups, such as public education, and an increase in public goods that are favored by the governing group, such as national defense.

A Appendix

Proof of Proposition 1

First, note that any transfer schedule such that the left side of (3.3) is lower than u_B induces group B to opt out as a best response, in which case such a transfer schedule is a best response for group A . Thus, there is always an equilibrium where group B opts out. Next, suppose that group B does not opt out. Then, it must be optimal for group A to set a transfer schedule which brings each individual in group B to his participation constraint. Furthermore, equation (3.4), together with the CRRA form of the utility function, imply that α^* must be independent of aggregate income realizations. In this case, the unique value of α^* is given by the expression stated in the proposition. Under (3.1), it must also be the case that group A 's expected utility is greater than u_A . This concludes the proof. \square

Proof of Proposition 2

All the comparative statics follow immediately from the participation constraint stated in Proposition 1 as a function of α^* . \square

Proof of Proposition 3

Let $F_Y(y)$ and $F'_Y(y)$ denote two alternative cumulative distributions of aggregate income. Let $\alpha^*(F)$ and $\alpha^*(F')$ denote the corresponding equilibrium governing group's share of aggregate income under $F_Y(y)$ and $F'_Y(y)$, respectively. First, suppose that F_Y dominates F'_Y in the first-order stochastic sense. Then $\alpha^*(F) > \alpha^*(F')$, since the agents' utility function $u(\cdot)$ is increasing. Second, suppose that F'_Y is a mean-preserving spread of F_Y . Then $\alpha^*(F) > \alpha^*(F')$, since the agents' utility function is concave. \square

Proof of Proposition 4

Given the discussion leading to Proposition 4, it is sufficient to consider the following strategy

profile. Group A chooses the social contract $\{\alpha_A, \alpha_1, \dots, \alpha_N\}$ if no one has deviated in the past, and otherwise, chooses $\alpha_A = 1$ and $\alpha_i = 0$ for all $i \in \{1, \dots, N\}$. Group i opts out if and only if someone has deviated in the past, for all $i \in \{1, \dots, N\}$. Since this is the worst subgame perfect equilibrium for all agents, any payoffs that can be enforced by some subgame perfect equilibrium can be enforced by the minmax strategies. Note that an efficient contract must include all groups, since $u_A = u_B = 0$, $y_A > 0$ and $y_i > 0$, for all $i = 1, \dots, N$. Furthermore, all non-governing groups are willing to participate in the social contract if and only if $v_i \geq 0$, for all $i = 1, \dots, N$. Next, for a contract to be enforced by a subgame perfect equilibrium it must be that group A does not have an incentive to deviate. Given the strategies of the non-governing groups, group A 's optimal deviation is to appropriate all income. Thus, group A will not have an incentive to deviate if and only if

$$E \left[u \left(\alpha_A \left(y_A + (n/N) \sum_{i=1}^N y_i \right) \right) \right] \geq (1 - \delta) E \left[u \left(y_A + (n/N) \sum_{i=1}^N y_i \right) \right]. \quad (\text{A.1})$$

It follows that the minimum post-transfer share of income, $\underline{\alpha}_A(\delta)$, that group A can obtain in a subgame perfect equilibrium solves (A.1) with equality. The comparative statics of $\underline{\alpha}_A(\delta)$ with respect to δ follow immediately from (A.1). \square

Proof of Proposition 5

It can be easily verified that the result follows from using the functional form of utility in the participation constraint (4.3), to solve for $\frac{\alpha_i y}{n/N}$, together with the fact that group i 's per capita transfers are given by $\frac{T_i}{n/N} = y_i - \frac{\alpha_i y}{n/N}$. \square

Proof of Proposition 6

Let $v_B > 0$. Suppose that $g(y_A, y_B) > 0$. Using (6.6) to eliminate T_B , one can solve (6.3) subject to (6.5) by choosing T_A and g for each $\{y_A, y_B\}$. The first-order condition with respect to T_A is given by (6.8), for each $\{y_A, y_B\}$. Using (6.8), it can be verified that the first-order condition with respect to g can be written as (6.9), for each $\{y_A, y_B\}$.

Next, given our assumptions on preferences, the first-order conditions (6.8) and (6.9) can be written as

$$\left(\frac{1-\eta_A}{1-\eta_B}\right) \left(\frac{z_B}{z_A}\right) \left(\frac{z_A\phi_A}{z_B\phi_B}\right)^\theta = \frac{\lambda}{n}, \quad (\text{A.2})$$

and

$$\left(\frac{\eta_A}{1-\eta_A}\right) \frac{z_A}{g} + n \left(\frac{\eta_B}{1-\eta_B}\right) \frac{z_B}{g} = 1, \quad (\text{A.3})$$

where $\eta_i \equiv (g/z_i) (\phi'_i/\phi_i)$ is the elasticity of the consumption bundle with respect to the public good. Under our Cobb-Douglas assumption (6.2), $\eta_i = \gamma_i$, where $\gamma_i \in (0, 1)$, for $i = A, B$, in which case, using (6.11)–(6.13), it can be verified that (A.2) and (A.3) imply that the shares α and β are constant, independent of the particular realization $\{y_A, y_B\}$. Hence, we can re-write (A.3) and (6.10) as the two equilibrium conditions stated in the proposition, in the two unknowns α and β .

To ensure that the social contract is such that $v_A > 0$, for any $v_B > 0$, we need to make sure that $\alpha^* > 0$, $\beta^* > 0$ and $1 - \alpha^* - \beta^* > 0$. First, note that for any $v_B > 0$ it will be the case that $\beta^* > 0$. It is also easy to verify that $1 - \alpha^* - \beta^* > 0$. Then, note that a necessary and sufficient condition for $\alpha^* > 0$ is that $\beta^* < 1 - \gamma_B$, which follows from the first equation in the statement of the proposition,

To show that the two equations stated in the proposition have a unique solution, first note that $1 - \alpha - \beta$ is a monotone function of β . Then, use the first condition to write the second condition as a function of β alone. To show that there is a unique value of β that solves this equation, note that

$$\frac{\partial}{\partial \beta} \left((\beta/n) \phi_B \left(\frac{\gamma_A + \left(\frac{\gamma_B - \gamma_A}{1 - \gamma_B}\right) \beta}{\beta/n} \right) \right) = \frac{\phi_B(\cdot)}{n} - \frac{\gamma_A \phi'_B(\cdot)}{\beta} = \frac{\phi_B}{n} \left(1 - \frac{\gamma_A \gamma_B}{1 - \alpha - \beta} \right), \quad (\text{A.4})$$

where the first equality follows from taking the derivative and the second one from the definition of the elasticity η_B and the fact that $\eta_B = \gamma_B$. To see that the left side of (A.4) is positive in any equilibrium with $\alpha > 0$, $\beta > 0$ and $1 - \alpha - \beta > 0$, note that it is indeed positive if and

only if $1 - \alpha - \beta > \gamma_A \gamma_B$. Expressing this condition as a function of β alone, by using the first equilibrium condition in the proposition, one can verify the following two statements: (1) if $\gamma_B \geq \gamma_A$, then $1 - \alpha - \beta > \gamma_A \gamma_B$ for all $\beta > 0$, and (2) if $\gamma_B < \gamma_A$, then $1 - \alpha - \beta > \gamma_A \gamma_B$ for all $\beta < 1 - \gamma_B$. Hence, $1 - \alpha - \beta > \gamma_A \gamma_B$, for all $\beta \in (0, 1 - \gamma_B)$, as required. This completes the proof. \square

Proof of Proposition 7

Let $F_Y(y)$ denote the cumulative distribution of aggregate income $y = y_A + ny_B$. The comparative statics of changes in F_Y or v_B are driven by the response of the consumption bundle $z_B \phi_B(g/z_B)$ to changes in β . The proof of Proposition 6 shows that $z_B \phi_B(g/z_B)$ is an increasing function of β . Since group B 's participation constraint must be always met, an increase in v_B must be met by an increase in β^* . Now consider the effect of aggregate income risk. Let $F'_Y(y)$ denote an alternative cumulative distribution of aggregate income. Suppose that F'_Y is a mean-preserving spread of F_Y . Since utility is strictly concave, it follows that a mean-preserving spread in the distribution of aggregate income must lower the expected utility of the non-governing group. Hence, β^* must increase if group B 's participation constraint is to continue to bind. The response of $1 - \alpha^* - \beta^*$ follows immediately from Proposition 6. \square

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