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Timothy Besley
Stephen Coate

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ABSTRACT

The welfare economic method for analyzing the case for government intervention is often criticized for ignoring the political determination of policies. While many economists accept the thrust of this critique, exactly when and how political determination interferes with a welfare economic analysis is not well understood. This paper explores the logic of the critique in a specific context, demonstrating how political determination of policy affects the case for government intervention. We show that one form of intervention is likely to have an impact on others through the political process. These spillover effects may even provide a justification for interventions that the welfare economic approach would reject.

Timothy Besley
Department of Economics
London School of Economics
London WC2A 2AE
U.K.
t.besley@lse.ac.uk

Stephen Coate
Department of Economics
Cornell University
Ithaca NY 14853
and NBER
s163@cornell.edu

1 Introduction

In what ways should the government intervene in the economy? Welfare economics has developed a powerful method for analyzing this question which has generated a set of standard prescriptions for government intervention. These include the provision of public goods and the regulation of externalities and natural monopolies.[1] Not only are these prescriptions influential in class-rooms, they have underpinned the views of generations of policy economists. Its influence notwithstanding, the welfare economic approach has its critics. Perhaps the most important are Buchanan and his followers in the public choice tradition. They argue that the approach is flawed because it ignores policy determination via a political process (see, for example, Buchanan (1962)). Thus, any political ramifications of government intervention are not taken into account. We call this the *public choice critique* of welfare economics.

Many economists now accept the basic thrust of the critique, and it is commonplace to acknowledge that political determination of policies may enter a caveat for the welfare economic model.[2] However, exactly when and how political determination interferes with a welfare economic analysis is not well understood. Properly accounting for the critique requires an intervention to be declared worthwhile only if social welfare with policies *at their*

[1] These are traditional prescriptions. Considerations of imperfect information provide a significant addition to the possibilities (see, for example, Greenwald and Stiglitz (1986)).

[2] For example, Stiglitz (1994) in discussing the significance of his work with Greenwald, notes that "the Greenwald-Stiglitz theorems should not primarily be taken as a basis of a prescription for government intervention. One of the reasons that they do not provide a basis for prescription is that doing so would require a more detailed and formal model of the government." (p.32)

politically determined levels exceeds social welfare without the intervention. Thus the key problem is to understand how new interventions impact the political equilibrium.

To gain a better understanding of the significance of the public choice critique, this paper explores its implications in a simple public finance model. The model allows for both government redistribution and public good provision. In the status quo, we assume that the government is only able to redistribute income, with public good provision left to the private sector. We then study the desirability of augmenting the government's capacities by giving it the right to choose the public good. This involves predicting the levels of the policy instruments that will be selected in political equilibrium before and after intervention and determining whether social welfare is higher with state provision of the public good.

Our analysis should be contrasted with previous efforts to study the implications of the public choice critique, such as Buchanan and Vanberg (1988). These have assumed that the new instrument will be set to please the median voter and (implicitly) that the levels of existing policy instruments remain fixed before and after the proposed intervention. We refer to this as the *median voter approach* to accounting for the public choice critique. Holding other instruments fixed is analogous to applying a partial equilibrium assumption to the political process, so that it is only necessary to consider the determination of the level of the new instrument. An intervention is then considered to be worthwhile if it raises social welfare (however measured) at the median voter's preferred level of the new policy. This chastens a welfare economic analysis which assumes that the analyst can select any level of the new policy. Political determination of the new policy is a constraint on policy choices

that makes intervention less attractive, leading to more conservative policy advice.

The key innovation of our analysis is that we model the determination of *all* policy instruments that the government can control after the new form of intervention is allowed. This allows us to consider the implications of new interventions for the levels of existing policy instruments. We find that there are conditions under which the median voter approach is justified. However, outside of these, neither assumption of the median voter approach should be expected to be valid — the new instrument may be set at non-majoritarian levels and existing instruments may change. Moreover, the conservative bias suggested by the median voter approach need not emerge. Intervention in one dimension can be adjudged beneficial due to its political consequences for *other* policy instruments.

Determining the political consequences of intervention in our set-up requires a model of political competition that functions when there is more than one dimension of policy. To accomplish this as simply as possible, we employ a model that is a hybrid of two existing approaches. Following Downs (1957), we specify the main actors as two political parties that care solely about winning. However, instead of committing to policies, the parties compete by putting up candidates for office. This follows the citizen-candidate approach due to Osborne and Slivinski (1996) and Besley and Coate (1997a). Choosing a candidate is a form of commitment, since the winning candidate is assumed to implement their preferred policy if elected. This theory yields a unique policy prediction that can be computed in examples.

The remainder of the paper is organized as follows. The next section provides the relevant

background material, briefly outlining the welfare economic approach, the public choice critique and the median voter approach. Section three outlines the model. Section four investigates political equilibrium with and without intervention and section five discusses the implications of these results for the case for intervention. Section six discusses the implications of several extensions, and section seven concludes.

2 Background

We are concerned with whether the government should intervene in some particular manner. For example. whether it should provide a good, such as health insurance, to its citizens or whether it should tax or subsidize some activity. The welfare economic approach employs two key concepts. The first is that of society's *utility possibility frontier* which describes the set of utility allocations that can be attained given a particular array of policy instruments. Underlying the frontier is a model of the private economy describing how citizens respond to different policy choices. The second concept is that of a *social ordering* which ranks the different utility allocations available to society. This ordering is typically in the form of a social welfare function, although sometimes the partial ordering implied by the Pareto Criterion is used. To evaluate the role of government, the frontier without the instrument being available to the government (the status quo) is contrasted with what can be attained when it is used. Intervention of a particular form is then recommended if and only if it permits the achievement of a socially preferred utility allocation.

Whether a particular intervention is recommended can depend on the assumptions made

about the policy instruments available in the status quo. The traditional (*first best*) view assumes that lump-sum taxes and transfers are feasible. Under the conditions of the Second Fundamental Welfare Theorem, the status quo frontier respects only technological feasibility constraints and there is no case for additional government intervention. Relaxing the conditions of this Theorem generates the classic market failure arguments for government intervention. Modern *second best* theory dispenses with the assumption of lump-sum taxation, usually on the grounds that government does not have sufficient information to implement such tax schemes. Diamond and Mirrlees (1971) developed the now standard case where the government uses linear income and commodity taxes to finance its activities and make compensations. Mirrlees (1971) introduced the additional possibility of non-linear income taxes. Second best analysis can support interventions that would not be supported in a first best world. For example, public provision of private goods may permit greater redistribution and/or enhance the efficiency of redistributive efforts when lump sum taxes and transfers are not available.

The canonical public choice critique of the welfare economic method is illustrated in Public Economics textbooks (see, for example, Stiglitz (1986) Figure 5.1) using a diagram such as Figure 1. Suppose that the frontier shifts out when the government has the power to undertake a particular intervention. The welfare economic method recommends intervention since any utility allocation that can be achieved without the instrument can be Pareto dominated. However, if the levels of the policy instruments will be politically determined, the political process will select which utility allocation from the new and old frontier will be

chosen. We might begin at a point like S in the picture and end up at point like P after the instrument is introduced. This new point is not dominant relative to the social welfare contour illustrated in the diagram. Thus studying the political process can undermine the welfare economic case for intervention. Whether we desire intervention in practice therefore depends on understanding the political process.

The conceptual framework underlying the public choice critique is one in which policy making is governed by a constitution (see, for example, Buchanan (1987)). In addition to specifying the process by which policy decisions are made, the constitution restricts the set/form of interventions that government may use. Citizens then work within the rules of the constitution to determine policy. The question of whether government should intervene in some manner is interpreted as whether the constitution should be amended to permit such intervention. The role of normative analysis is to advise on such amendments — recognizing that the levels of policy instruments will be determined by the political process.

While this conceptual framework is artificial, it is a useful vehicle for maintaining a role for normative inquiry about the economic role of government when the political process is taken seriously. From a policy analysis perspective, such analysis seems appropriate when the analyst can influence only broad directions of policy, with exact implementation left up to the political process. For example, it would seem the appropriate analytical framework for members of government commissions charged with recommending whether to privatize state owned enterprises or introduce universal public health insurance.

An analysis of government intervention that takes account of the public choice critique

requires a theory of policy determination to predict the equilibrium policy levels. In terms of Figure 1, the theory must predict the move from S to P. The analyst can then compare the utility allocations with and without intervention according to the chosen social criterion. The median voter approach assumes that the level of the new policy instrument will be that preferred by the median voter and that the new policy instrument will have no impact on the selection of the status quo instruments. The first of these is familiar and is the cornerstone of the approach. The second is rarely made explicit. However, the instrument that is being determined could not reasonably be thought of as the only policy chosen by a government, even though these other instruments are rarely mentioned. Hence, the rationalization is best thought of as being that these other instruments are being held fixed.

Buchanan and Vanberg's (1988) analysis of intervention to deal with an externality illustrates this method. Figure 2 depicts the textbook analysis of a polluting industry. The good is produced at constant cost c and the market equilibrium is Q_m units. A welfare economic approach recommends intervention using a Pigouvian tax z on the grounds that welfare would be higher if the tax were set at z^*, its surplus maximizing level. However, Buchanan and Vanberg argue that intervention should be recommended only if aggregate surplus at the *majority preferred level of the tax* is higher than at the market equilibrium. The majority preferred level depends on the numbers of and interconnections between those citizens who consume the good, those who are polluted and those who receive any tax revenues raised. These details determine whether aggregate surplus will be higher at the majority preferred level of taxation.

3 The Model

3.1 Economic Environment

There are N citizens and three goods: a private good x, labor ℓ and a public good g. Citizens are endowed with $\overline{\ell}$ units of labor time and can transform this into units of the private good. There are three ability groups; "poor", "middle class" and "rich", with citizens in ability group $\theta \in \{P, M, R\}$ producing a_θ units of the private good per unit of labor, where $a_R > a_M > a_P$. To produce one unit of the public good costs c units of the private good.

Citizens have identical preferences over the private good and labor supply, but differ in their public good preferences. There are two preference types; low and high, with citizens of preference type $\lambda \in \{L, H\}$ having utility functions $x - \phi(\ell) + b(g, \lambda)$. The function $\phi(\cdot)$ represents the disutility of labor and the function $b(\cdot)$ represents the "willingness to pay" for the public good. We assume that $\phi(\cdot)$ is a smooth, increasing and strictly convex function such that $\phi'(0) = 0$ and $\phi'\left(\overline{\ell}\right) > a_R$. The function $b(\cdot)$ is assumed to be smooth, increasing and strictly concave in g, and to satisfy $b(0, \lambda) = 0$. High types have a higher marginal valuation of any given level of public goods; i.e., $b_1(g, L) < b_1(g, H)$ for all g. We assume that the marginal valuation of a high type is less than the unit cost of the public good, but higher than its per capita cost; i.e., $c > b_1(0, H) > c/N$.

The number of citizens of type (θ, λ) will be denoted N_θ^λ with $N_\theta^\lambda > 0$ for all (θ, λ). We also let N_θ denote the total number of type θ citizens and N^λ the number of type λ citizens. We will assume throughout that the middle class is the median group, so that $N_P < N/2$

and $N_R < N/2$. In addition, we suppose that a majority of citizens have low public good preferences; i.e., $N^L > N^H$.

3.2 Policies

We are interested in comparing two policy regimes (or constitutions) denoted by $r \in \{0, 1\}$. In Regime 0 (*the status quo*), the policy maker chooses only a redistributive instrument. This is assumed to be a negative income tax scheme where the rate of income taxation, denoted by t, is chosen with the proceeds being redistributed back to citizens in lump-sum fashion. Such a scheme permits redistribution from higher to lower ability groups.[3] In Regime 1 (*state provision*), the policy maker also chooses a level of the public good z. Spending on the public good must be financed by raising the income tax rate and/or reducing the uniform transfer. We assume the latter can be negative, which permits the public good to be financed in a uniform way; i.e., via a head tax. For notational simplicity, we suppose that the policy maker chooses (t, z) in either regime, but in the status quo is subject to the constitutional constraint that $z = 0$.

The policy pair (t, z) is chosen at the beginning of the period, anticipating market behavior. Given the policy pair (t, z), a citizen of ability type θ will choose to earn income $y(t, a_\theta)$ where $y(t, a) = \arg\max\{(1-t)y - \phi(y/a)\}$. Government revenue will then be $Nt\overline{y}(t) - cz$. where $\overline{y}(t)$ denotes mean earnings at the tax rate t, and each individual will receive a transfer $t\overline{y}(t) - cz/N$. Private provision of the public good is determined via a voluntary contribution

[3] We follow the literature in supposing that the constitution requires that $t \in [0, 1]$, which prevents the scheme being used to redistribute towards higher ability groups.

game in which each citizen simultaneously chooses an amount of public good to purchase. Under our assumption that the marginal valuation of a high type is less than the unit cost of the public good, the market will provide none of the public good irrespective of the level provided by the government. Thus, a citizen of type (θ, λ) will enjoy a utility level of

$$t\overline{y}(t) - cz/N + (1-t)y(t, a_\theta) - \phi(y(t, a_\theta)/a_\theta) + b(z, \lambda).$$

Letting $v(t, \theta) = (1-t)y(t, a_\theta) + t\overline{y}(t) - \phi(y(t, a_\theta)/a_\theta)$ and $m(z, \lambda) = b(z, \lambda) - cz/N$, we may write this more succinctly as $v(t, \theta) + m(z, \lambda)$.

Let $t^*(\theta)$ denote the preferred tax rate of a citizen with ability type θ; that is, $t^*(\theta) = \arg\max\{v(t, \theta) : t \in [0, 1]\}$. It is clear that the rich do not desire any redistribution; i.e., $t^*(R) = 0$ and that the poor prefer a higher level of redistribution than do the middle class, i.e., $t^*(P) > t^*(M)$. We will assume that the middle class desire some redistribution (i.e., $t^*(M) > 0$) which requires that their income be below the mean at $t = 0$. We let $z^*(\lambda)$ denote the preferred public goods level of a citizen with public good preference λ; that is, $z^*(\lambda) = \arg\max m(z, \lambda)$. Our assumptions imply that $z^*(L) < z^*(H)$.

3.3 Policy determination

There are two political parties, A and B which compete by selecting candidates to run for office.[4] The parties care only about winning; i.e., that their candidate is elected. To be

[4] We assume *candidate* competition rather than the usual *policy* competition because the former is much more tractable. With candidate competition, parties are effectively restricted to selecting policy platforms which are the optimal choice for some type of citizens. This makes strategy sets finite which guarantees existence of equilibrium and makes computing equilibrium in applications relatively straightforward. Substantively, we believe that both the candidate and policy competition models capture some essence of the

concrete, we suppose that each party receives a payoff of $+1$ if its candidate is elected and a payoff of -1 otherwise. Candidates are citizens and are characterized by their types (θ, λ). No *ex ante* policy commitments are possible so that, if elected, a candidate of type $(\theta.\lambda)$ chooses his preferred policy vector in Regime $r \in \{0,1\}$. This is denoted by $(t^r(\theta), z^r(\lambda))$. Given our assumptions, $t^0(\theta) = t^1(\theta) = t^*(\theta)$, $z^0(\lambda) = 0$ and $z^1(\lambda) = z^*(\lambda)$.

Citizens vote for the candidate who delivers their preferred policy outcome. Thus, in Regime r, if the parties select candidates of types (θ_A, λ_A) and (θ_B, λ_B) respectively, a citizen of type (θ, λ) will vote for Party A's candidate if his utility under the policy package $(t^r(\theta_A), z^r(\lambda_A))$ is larger than that under $(t^r(\theta_B), z^r(\lambda_B))$. We assume that indifferent voters vote randomly with equal probability for each party. Voting decisions depend upon the policies that elected representatives can choose. Thus, candidates' public good preferences become relevant with state intervention, and can induce citizens to vote differently than when redistribution is the only policy being chosen. This observation is key to understanding the political consequences of new interventions.

Let $\pi^r((\theta_A, \lambda_A), (\theta_B, \lambda_B))$ denote the probability that Party A's candidate wins when the two parties select candidates of types (θ_A, λ_A) and (θ_B, λ_B) in Regime r. This probability will be 1 if Party A's candidate attracts more votes than Party B's; $\frac{1}{2}$ if the two candidates tie; and 0 otherwise. Since in the status quo, a candidate's public good preference is irrelevant for voters' decisions, no confusion arises from writing $\pi^0(\theta_A, \theta_B) = \pi^0((\theta_A, \lambda_A), (\theta_B, \lambda_B))$.

Each party decides what type of candidate to put forward. A (pure) strategy for Party

nature of political competition and hence that the choice between them may legitimately be made on the grounds of tractability.

$J \in \{A, B\}$ is denoted by (θ_J, λ_J). Party A's expected payoff from the strategy pair $((\theta_A, \lambda_A), (\theta_B, \lambda_B))$ in Regime r is $2\pi^r(\cdot) - 1$, while Party B's expected payoff is $1 - 2\pi^r(\cdot)$. A mixed strategy for Party $J \in \{A, B\}$ is denoted by σ_J with $\sigma_J(\theta, \lambda)$ denoting the probability that Party J selects a candidate of type (θ, λ). An *equilibrium* in Regime r is a pair of mixed strategies (σ_A, σ_B) such that each party is maximizing its expected payoff given the strategy of the other party. An equilibrium (σ_A, σ_B) is a pure strategy equilibrium if there exists $((\theta_A, \lambda_A), (\theta_B, \lambda_B))$ such that $\sigma_J(\theta_J, \lambda_J) = 1$ for $J \in \{A, B\}$ and a mixed strategy equilibrium otherwise.

It is well-known from a vast literature that, with two policy dimensions, it is unlikely that there will be one candidate that beats all others pairwise — a so-called *Condorcet winner*. In that situation, we can have *cycles* where, for every candidate type a party can put forward, there is another candidate type that the opposition can use to defeat it. This is when the mixed strategies come into play. Moreover, since each party has only a finite set of strategies, we can be sure that mixed strategy equilibria exist. Using a standard interpretation due to Harsanyi, these equilibria can be interpreted as the limit of pure strategy equilibria in a game of incomplete information, where there is a small amount of uncertainty about each party's policy preference.[5]

Any equilibrium (σ_A, σ_B) in Regime r gives rise to a probability distribution over the available policies. We will use ρ to denote a generic probability distribution over policies and will denote the probability distribution over policies in Regime r associated with the

[5] See Myerson (1991) pages 129-33 for a discussion of this.

equilibrium (σ_A, σ_B) by $\rho^r(\sigma_A, \sigma_B)$. Using this notation, the expected utility of a citizen of type (θ, λ) in Regime r when the equilibrium is (σ_A, σ_B) can be written as $V(\rho^r(\sigma_A, \sigma_B); \theta, \lambda)$, where

$$V(\rho; \theta, \lambda) = \sum_{(t,z)} [v(t, \theta) + m(z, \lambda)]\rho(t, z).$$

We use a general property of the class of games that we are studying (so-called *tournament games*) due to Laffond, Laslier and Le Breton (1993). They show that with a finite set of alternatives and no ties between any distinct pair of alternatives, the equilibrium of a tournament game like ours is symmetric and unique. In our application, ruling out ties in Regime 1 is not restrictive and, hence we can work with the assurance that our equilibrium has these properties. In Regime 0, ties arise naturally because voters are indifferent between candidate types (θ, λ) and (θ, λ'). Nonetheless, the Laffond, Laslier and Le Breton result implies that any equilibrium has both parties choosing the same probability distribution over the policy relevant characteristic θ. Accordingly, in either regime, there is a unique equilibrium probability distribution over policy outcomes.

4 Political Equilibrium in the Two Regimes

To assess the desirability of state provision of the public good while respecting the public choice critique has two steps. First, we characterize the probability distributions over policy outcomes in each regime - ρ^0 and ρ^1. Then, we assess whether social welfare at the utility allocation $\{V(\rho^1; \theta, \lambda)\}$ exceeds that at the utility allocation $\{V(\rho^0; \theta, \lambda)\}$. Restricting attention to comparison of the utility allocations generated in political equilibrium is the key

restriction since the political consequences of intervention are anticipated and accounted for in the calculation. This section deals with the first step.

4.1 Political Equilibrium in the Status Quo

In this model, the status quo is extremely simple since voters care solely about a candidate's redistributive preference. The usual logic then implies that both parties select middle class candidates to appeal to the median voter. Thus we have:

Proposition 1 *In the status quo, political equilibrium involves both parties selecting middle class candidates and the policy outcome is* $(t^*(M), 0)$.

4.2 Political Equilibrium with State Provision

We do not provide an exhaustive characterization of political equilibrium under state provision. To do so, even for this simple model, would result in a much too long a paper. Instead, we proceed in two stages. First, we identify conditions under which political equilibrium with state provision is that predicted by the median voter approach. Second, we focus on two examples where political equilibrium with state provision is rather different and has interesting implications for the welfare analysis.

The properties of political equilibrium with state provision depend upon how different groups of voters weigh up redistributive concerns against public good preferences. For example, a poor candidate who prefers a low level of the public good may be forced to choose between (P, H) and (M, L) candidates. Which he prefers depends upon whether the loss from not having his preferred level of redistribution is greater or less than the loss from not having his preferred level of public good. This can be approached in general as follows. Let

Ω_λ denote the gain to a citizen with public good preferences λ from getting his/her preferred level of the public good and let $\Delta^\theta_{\theta'}$ denote the gain to a citizen of ability type θ from getting his preferred level of taxation rather than that which would be chosen by an ability type θ'.[6] Then, the type (P, L) citizen prefers the (P, H) candidate to the (M, L) candidate if $\Delta^P_M > \Omega_L$.

This reasoning can be used to consider who will win a race between any pair of candidates. Suppose, for example, that the race is between a middle class candidate with a low public good preference and a rich candidate with a high public good preference. Clearly, the middle class candidate will receive the support of type (M, L) and (P, L) citizens, while the rich candidate will receive the support of type (R, H) citizens. Citizens of type (M, H) will vote for the rich candidate if and only if $\Omega_H > \Delta^M_R$. Similarly, citizens of type (P, H) will vote for the rich candidate if and only if $\Omega_H > \Delta^P_R - \Delta^P_M$ and citizens of type (R, L) vote for the rich candidate if $\Delta^R_M > \Omega_L$. The electoral outcome thus depends on the numbers of each type and on the relative magnitudes of the Ω_λ and $\Delta^\theta_{\theta'}$ terms.

Some structure on how different types of citizens will vote is provided by the following useful result.

Lemma 1 *(i)* $\Delta^P_R - \Delta^P_M > \Delta^M_R$, *(ii)* $\Delta^R_P - \Delta^R_M > \Delta^M_P$. *and (iii)* $\Delta^R_M > \Delta^M_R$.

Properties (i) and (ii) tell us that a poor citizen's gain from a middle class candidate rather than a rich candidate exceeds that of a middle class citizen and that a rich citizen's gain from

[6] Thus $\Omega_L = m(z^*(L), L) - m(z^*(H), L)$, $\Omega_H = m(z^*(H), H) - m(z^*(L), H)$ and $\Delta^\theta_{\theta'} = v(t^*(\theta), \theta) - v(t^*(\theta'), \theta)$.

a middle class candidate rather than a poor candidate exceeds that of a middle class citizen. These properties follow from the convexity of the disutility of labor function. Property (iii) tells us that a rich citizen's gain from a rich candidate rather than a middle class candidate exceeds a middle class citizen's gain from a middle class candidate rather than a rich candidate. It reflects the fact that redistribution entails deadweight loss and the assumption that the rich are a minority.

4.2.1 When is the Median Voter Approach Valid?

The median voter approach assumes that the level of the new policy instrument will be that preferred by the median voter and that the new policy instrument will have no impact on the selection of the status quo instruments. Thus, it will be valid when the equilibrium probability distribution selects $(t^*(M), z^*(L))$ which will occur if and only if each party puts forward a type (M, L) candidate. Such candidates are politically attractive – they defeat type (P, L), (R, L) and (M, H) candidates. However, the critical issue is whether they also defeat candidates of types (P, H) and (R, H). If they do, then a type (M, L) candidate is a Condorcet winner in the set of candidate types and will be selected by both parties.

There are two conditions under which this will occur. The first is that in races between middle class and non-middle class candidates, differences in candidates' public good preferences are less important to minority voters than are differences in their redistributive preferences. Technically, this amounts to the assumption that $\Omega_H < \min\{\Delta_P^M, \Delta_R^M\}$. In this case, poor and middle class citizens with high public good preferences will not desert

an (M, L) candidate in favor of a (R, H) candidate. Since the (M, L) candidate is already receiving the support of poor and middle class citizens with low public good preferences, he must defeat a (R, H) candidate. Similarly, rich and middle class citizens with high public good preferences will not desert an (M, L) candidate in favor of a (P, H) candidate, which ensures the former wins.

Proposition 2 *Suppose that* $\Omega_H < \min\{\Delta_P^M, \Delta_R^M\}$. *Then, with state provision, political equilibrium involves both parties selecting middle class candidates with low public good preferences and the policy outcome is* $(t^*(M), z^*(L))$.

The second condition for the median voter approach to be valid is that, in races between middle class and non-middle class candidates, differences in candidates' public good preferences are more important to majority voters than are differences in their redistributive preferences. Technically, this amounts to the assumption that $\Omega_L > \min\{\Delta_M^P, \Delta_M^R\}$. Under this condition, rich citizens with low public good preferences will support an (M, L) candidate against a (R, H) candidate. Since the (M, L) candidate is already receiving the support of poor and middle class citizens with low public good preferences, he must defeat a (R, H) candidate. Similarly, poor citizens with low public good preferences will support an (M, L) candidate against a (P, H) candidate which ensures the former wins.

Proposition 3 *Suppose that* $\Omega_L > \min\{\Delta_M^P, \Delta_M^R\}$. *Then, with state provision. political equilibrium involves both parties selecting middle class candidates with low public good preferences and the policy outcome is* $(t^*(M), z^*(L))$.

4.2.2 Departures from the Median Voter Approach

Departures from the median voter approach occur when non-middle class candidates with high public good preferences can beat middle class candidates with the majority public

good preference. This requires some asymmetry between the different types of voters. More precisely, it must be the case that for some types of voters, differences in candidates' public good preferences are less important than are differences in their redistributive preferences while for others they are more important. We now focus on two cases where such asymmetries arise.

An Intense Minority For this example, we suppose that citizens with high public good preferences vote according to their public good preferences, while those with low public good preferences vote according to their redistributive preferences. This might be the case when the public good appeals most strongly to a small but cohesive minority, such as an ethnic, religious or geographically concentrated group. This group of citizens then become single issue voters, always voting according to their public good preferences. The formal assumption underlying this behavior is:

Assumption 1 *(i)* $\Omega_H > \max\{\Delta_P^R, \Delta_R^P\}$; *(ii)* $\Omega_L < \min\{\Delta_M^P, \Delta_R^M, \Delta_P^M\}$.

When combined with Lemma 1, part (i) implies that citizens with high public good preferences vote their public good preferences, while part (ii) implies that low public good preferring citizens vote their redistributive preferences.

To see the implications of this asymmetry in voter behavior, consider a race between a type (M, L) candidate and a (P, H) candidate. Assumption 1 is sufficient to imply that all of the type H citizens support the (P, H) candidate along with the (P, L) citizens. Thus, if $N_H + N_L^P > N_L^M + N_L^R$, the type (M, L) candidate would lose. Similarly, a (R, H) candidate

would defeat a (M, L) candidate if $N_H + N_L^R > N_L^M + N_L^P$. The political equilibrium in this case is described in the following Proposition:

Proposition 4 *Suppose that Assumption* 1 *is satisfied and that* $\Delta_P^M < \Delta_R^M$. *Then, if* $N_H + N_L^P > N_L^M + N_L^R$ *and* $N_H + N_L^R > N_L^M + N_L^P$, *the political equilibrium with state provision involves both parties choosing candidates of type* (M, L), (M, H) *and* (P, H) *with equal probability. The resulting probability distribution over policy outcomes selects* $(t^*(M), z^*(L)), (t^*(M), z^*($ *and* $(t^*(P), z^*(H))$ *with equal probability.*

Thus, the equilibrium mixed strategy is to choose between three different kinds of candidates with equal probability. Neither assumption of the median voter approach is valid. The minority has a strong influence on policy towards the public good — it gets its preference two thirds of the time. Perhaps more significantly, the existence of the minority also affects the redistributive outcome, in this case moving it towards greater redistribution one third of the time. This is because the minority has to gain favor by banding together with citizens who have particular redistributive preferences in order to defeat a majoritarian candidate.

In this example, the poor gain a redistributive benefit from the intense minority. This reflects the assumption in the Proposition that $\Delta_P^M < \Delta_R^M$, which says that the middle class vote for a poor candidate over a rich candidate when they share the same public good preferences. If we had assumed instead that $\Delta_P^M > \Delta_R^M$, then political equilibrium would involve both parties choosing candidates of type (M, L), (M, H) and (R, H) with equal probability. Thus, the key determinant of the shift in the redistributive policy is the redistributive preferences of the middle class.

A Rightward Leaning Middle Class Suppose now that the preferred tax rate of the middle class is close to the zero rate preferred by the rich. Accordingly, middle class citizens vote their public good preferences in races between middle class and rich citizens but their redistributive preferences in races involving poor candidates. All other classes vote their redistributive preferences in all races. The asymmetry in this example therefore arises in races between middle class and rich candidates in which case the middle class votes according to their public good preferences, while rich and poor citizens vote according to their redistributive preferences.

Formally, the required assumptions are:

Assumption 2 *(i)* $\Delta_R^M < \min\{\Omega_L, \Omega_H\}$; *(ii)* $\Delta_P^M - \Delta_R^M > \max\{\Omega_L, \Omega_H\}$; *(iii)* $\Delta_M^P > \max\{\Omega_L, \Omega_H\}$; *(iv)* $\Delta_R^P - \Delta_M^P > \max\{\Omega_L, \Omega_H\}$; *(v)* $\Delta_M^R > \max\{\Omega_L, \Omega_H\}$.

Properties (i) and (ii) imply that the middle class vote their public good preference in races between rich and middle class candidates and their redistributive preferences in races involving poor candidates. The remaining properties, when combined with Lemma 1, imply that poor and rich citizens vote their redistributive preferences. Lemma 1 implies that (iv) and (v) are perfectly consistent with (i).

Under these assumptions, intervention may cause political influence to switch in favor of the rich – a rich candidate may be able to tempt sufficient middle class support if he supports a high level of the public good. In a race against a type (M, L) candidate, a type (R, H) candidate will receive the votes of all the rich and the middle class citizens with high public good preferences. Thus, the (R, H) candidate will win if $N^R + N_H^M > N^P + N_L^M$. Similarly,

a type (R, L) candidate will defeat a type (M, H) candidate if $N^R + N_L^M > N^P + N_H^M$. Poor candidates will, however, lose to both rich and middle class candidates. Accordingly, if these conditions hold, then we will have a race dominated by the rich and the middle class as the following Proposition shows.

Proposition 5 *Suppose that Assumption 2 is satisfied. Then, if* $N^R + N_H^M > N^P + N_L^M$ *and* $N^R + N_L^M > N^P + N_H^M$, *the political equilibrium with state provision involves both parties choosing candidates of type* (M, L), (R, L) *and* (R, H) *with equal probability. The resulting probability distribution over policy outcomes selects* $(t^*(M), z^*(L)), (t^*(R), z^*(L))$ *and* $(t^*(R), z^*(H))$ *with equal probability.*

Again, neither assumption of the median voter approach is valid. The public goods level is non-majoritarian with probability 1/3 and the level of the status quo policy changes with probability 2/3. The reason is that a rich candidate with high public good preferences can attract middle class voters who share the candidate's public good preferences. However, the asymmetry in the gains and losses from redistribution, imply that rich voters remain loyal to candidates of their own class. Thus the rich reap a political reward from the intervention and, in the process, a high level of the public good is selected some of the time.[7]

4.2.3 Summary

To summarize, there are conditions under which political equilibrium with intervention can justify the median voter approach. Roughly speaking, the median voter approach will be valid when either differences between citizens on the new policy issue are unimportant rela-

[7] While this example considered a rightward leaning middle class, this is purely illustrative. Parallel results can be obtained for the case where the middle class is leftward leaning in the sense that the desired tax rate of the middle class is close to that preferred by the poor. This would yield a shift towards the poor's preferred level of redistribution together with the possibility of a non-majoritarian level of the public good.

tive to differences in preferences over existing instruments or when they are of overwhelming importance. Thus, our model follows common sense in suggesting that allowing the government to construct public lamp posts is unlikely to disturb other policies - the issue is not divisive enough to split preexisting coalitions. At the other extreme, the decision to fight a major war should follow the median voter's preference and should not disturb other policies — candidates with non-majority position will not be able to attract sufficient voters to unsettle this.

Outside of these conditions, we should not expect either assumption of the median voter approach to be valid. Political equilibrium with intervention is likely to produce both non-majoritarian levels of the new instrument and changes in the status quo instruments with positive probability. As our two examples reveal, the exact nature of equilibrium policy choices is sensitive to the precise specification of preferences and the distribution of citizens across types. Thus, no simple rule of thumb to replace the median voter approach is available. Nonetheless, as we shall now see, such non-standard political consequences of intervention are important from the viewpoint of policy analysis, since accounting for them can lead to very different policy advice than would emerge either from a pure welfare economic analysis or a welfare political economy analysis using the median voter approach.

5 The Case for Intervention

We now turn to whether social welfare in the state provision regime exceeds that in the status quo. For concreteness, we work with a specific social welfare function - aggregate

utility.[8] Under this specification, the socially optimal level of income redistribution is zero. This is because redistribution generates a deadweight loss and, with quasi-linear utility, the value of a dollar of private consumption is the same to any citizen. Following the usual Samuelson condition, the welfare economic approach recommends intervention to provide the public good if the sum of marginal benefits of the good at $g = 0$ exceeds its marginal cost; i.e., $\sum_\lambda N_\lambda b_1(0;\lambda) > c$.

To see the force of the public choice critique, suppose first that the political equilibrium with state provision justifies the median voter approach. Since there is no impact of intervention on the level of redistribution, the issue boils down to whether aggregate public good surplus is positive at the majority preferred level of the public good. If $z^*(L) > 0$ then this must be true, while if $z^*(L) = 0$ it is not. Thus, when the median voter approach is valid. intervention is warranted if and only if $z^*(L) > 0$ or, equivalently, if and only if $Nb_1(0;L) > c$. Since this condition implies the Samuelson condition, if intervention is warranted under the median voter approach it is also justified by the welfare economic approach. The converse will not, however, be true when $Nb_1(0;\lambda) < c < \sum_\lambda N_\lambda b_1(0;\lambda)$. In this case, therefore, political economy concerns dampen the case for intervention, albeit somewhat marginally.[9]

In cases where political equilibrium with state provision does not justify the median voter approach, we have non-majoritarian levels of the public good and shifts in redistribution to

[8] That is, $\sum_{(\theta,\lambda)} N^\theta_\lambda[v(t,\theta) + m(z,\lambda)]$.

[9] In this case, the worst that can happen is that the welfare economic approach recommends an intervention that ends up producing zero surplus. If the majority had high public good preferences and if $\sum_\lambda N_\lambda m(z^*(H),\lambda) < 0$, it might end up recommending an intervention that generates negative surplus.

account for. To be concrete, we focus on the case for intervention in the examples that we worked out in the last section. We use our first example of an intense minority to show how political consequences can hurt the case for intervention for reasons beyond those captured by the median voter approach. Assume that $Nb_1(0;L) > c$, so that intervention is desirable under the median voter approach, but suppose that the level demanded by the minority is considerably in excess of that demanded by low types so that $\sum_\lambda N_\lambda m(z^*(H);\lambda) < 0$.

Under the assumptions of Proposition 4, there is a gain from intervention if

$$\sum_\theta N_\theta[v(t^*(P);\theta) - v(t^*(M);\theta)] + [2\sum_\lambda N_\lambda m(z^*(H);\lambda) + \sum_\lambda N_\lambda m(z^*(L);\lambda)] > 0.$$

The first term is the change in social welfare resulting from the increase in the tax rate from $t^*(M)$ to $t^*(P)$, while the second term (in square brackets) is expected public goods surplus. The first term can be shown to equal $\int_{t^*(M)}^{t^*(P)} t \cdot N \cdot \overline{y}'(t)dt$ - the negative of the increase in the excess burden of the tax resulting from the tax hike. It therefore reflects the social costs of the possible increase in redistribution. The second term may also be negative because of the possibility that intervention generates the minority's preferred level of the public good which, by hypothesis, generates negative aggregate surplus. If this second term is negative, then there is clearly no case for intervention. If it is positive, then these expected public good benefits need to be weighed against the costs of higher redistribution. For our purposes. the key point to appreciate is how the possibility of changes in other instruments and in non-majoritarian levels of the new instrument yields a much weaker case for intervention than that suggested by the median voter approach.

Turning now to our second example of a rightward leaning middle class, we show how political consequences can help the case for intervention. Suppose that the Samuelson condition is not satisfied ($\sum_\lambda N_\lambda b_1(0;\lambda) < c$) so that there is no welfare economic case for intervention. This implies that the optimal level of the public good is zero for type L citizens and that $\sum_\lambda N_\lambda m(z^*(H);\lambda) < 0$. Allowing intervention to provide the public good can be shown to be welfare enhancing if

$$2\int_0^{t^*(M)} -t \cdot N \cdot \overline{y}'(t)dt > cz^*(H) - \sum_{\lambda\in\{L,H\}} N_\lambda b(z^*(H),\lambda).$$

The term on the left hand side is twice the reduction in the excess burden of the tax which would result from a change from rate $t^*(M)$ to $t^*(R) = 0$. The term on the right hand side is the reduction in aggregate surplus resulting from providing the public good at the minority's preferred level. It is perfectly possible for this inequality to be satisfied, in which case intervention is desirable on the grounds of its beneficial redistributive consequences.

This example shows that accounting for the public choice critique need not dampen the case for intervention relative to a welfare economic approach. This is because the political process does not select the socially optimal redistributive policy prior to intervention. Moreover, it is the political consequences of intervention that provide the justification for intervention. While state provision of a public good may seem like a rather blunt instrument for reducing redistributive taxes, it is the only feasible way of doing so given that policy outcomes are determined via the political process. The reasoning has a Machiavellian ring to it. However, it is a consequence of incorporating political economy concerns into the welfare

economic framework in this way.[10]

6 Discussion

We now briefly discuss some extensions of our simple model which further enhance our understanding of the implications of the public choice critique.

6.1 Multiple Status Quo Policy Instruments

Our model assumes that there is only one status quo policy instrument. This implies that a Condorcet winner exists in the status quo policy regime. The validity of the median voter approach then simply boils down to whether, in Regime 1, (M, L) is a Condorcet winner in the set of candidate types $\{P, M, R\} \times \{L, H\}$. This observation generated the sufficient conditions in Propositions 2 and 3. With multiple status quo policy instruments, the existence of a Condorcet winner is less likely in the status quo, suggesting that assessing the political consequences of intervention might be more challenging. While this is certainly true, the conditions under which the median voter approach is valid do generalize.

Thus, consider a generalization of our model where t is a multi-dimensional vector of status quo policies and θ is a (possibly) multi-dimensional vector of characteristics. As above, type θ citizens have preferences over the status quo policies $v(t, \theta)$. Let the set of citizen preference types over the status quo instruments be denoted Θ. For any given probability distribution over policies ρ, let ρ_t and ρ_z denote the implied probability distributions over the

[10] The particular conclusion that *reduced* redistribution is good is an artifact of our specification of individual and social preferences. One could equally construct examples where interventions are supported for their political consequences because they increase the level of welfare enhancing redistribution.

status quo instruments and the public good, respectively. Then, the political consequences of intervention will be as described by the median voter approach if (i) $\rho_z^1(z^*(L)) = 1$ and (ii) $\rho_t^1 = \rho_t^0$. The first condition says that the majority preferred level of the public good is selected with probability one, while the second says that the probability distribution over the status quo instruments is the same as in Regime 0.

Assume that no Condorcet winner exists in the set of candidate types Θ in Regime 0.[11] Then, political equilibrium in Regime 0 will involve parties mixing over the set of candidate types Θ and the public good preferences of the candidates will be irrelevant. For the median voter approach to be valid, both parties must continue to put forward (with the same probabilities) candidates with the same type of preferences over the status quo issues but who have the majority preference on the public good. To see when this will occur, let $\Omega \subset \Theta$ denote the set of candidate types selected with positive probability in the status quo equilibrium.[12] Suppose that for all $\theta \in \Omega$ the following condition is true: if θ defeats $\theta' \in \Theta$ in the status quo, then (θ, L) defeats (θ', H); i.e., $\pi^0(\theta, \theta') = 1$ implies that $\pi^1((\theta, L), (\theta', H)) = 1$. Then it is straightforward to show that equilibrium in Regime 1 will involve both parties mixing (with the same probabilities) over the same type of candidates as in the status quo, except that these candidates will all be of type L.[13]

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[11] If, in Regime 0, there exists a Condorcet winner θ^* in the set of candidate types Θ, then the median voter approach is valid if and only if (θ^*, L) is a Condorcet winner in the set of candidate types $\Theta \times \{L, H\}$ in Regime 1.

[12] The set Ω can be bounded in a number of ways. For example, it can be shown to be a subset of the uncovered set. See Laffond, Laslier and Le Breton (1993) for more details.

[13] To see this, suppose that Party A is playing according to this strategy and consider the problem faced by Party B. If Party B always selects type L candidates, then it can do no better than use the same

Sufficient conditions for the median voter approach can be obtained by considering the circumstances under which the above condition will hold. Appropriately generalized, the two conditions developed in Section four remain sufficient. The first condition is that in races between candidates of types $\theta \in \Omega$ and $\theta' \in \Theta/\{\theta\}$, differences in candidates' public good preferences are less important to minority voters than are differences in their preferences over the status quo issues. Thus, in races between candidates of types (θ, L) and (θ', H), type H citizens will continue to vote as they would have done in the status quo. Accordingly, $\pi^0(\theta, \theta') = 1$ implies that $\pi^1((\theta, L), (\theta', H)) = 1$. The second condition is that in races between candidates of types $\theta \in \Omega$ and $\theta' \in \Theta$, differences in candidates' public good preferences are more important to majority voters than are differences in their preferences over the status quo issues. Thus, in races between candidates of types (θ, L) and (θ', H), the type (θ, L) candidate will receive all the votes of the type L citizens and hence will win. It is therefore trivially the case that $\pi^0(\theta, \theta') = 1$ implies that $\pi^1((\theta, L), (\theta', H)) = 1$.

6.2 Non-separable Policy Preferences

An important lesson of our analysis is that introducing an additional policy instrument can lead to changes in the levels of existing instruments with significant redistributive consequences. We have demonstrated this in a model in which the two instruments in question are separable — citizens' willingness to pay for the public good is independent of the income

strategy as in Regime 0 with respect to candidate preferences over the status quo instruments. Since both parties are offering candidates of type L, the new issue is neutralized and only candidate positions with respect to the status quo policies matter. The situation is therefore strategically identical to the situation in Regime 0. The only issue, therefore, is whether Party B would wish to select a candidate of type H. It would only have an incentive to do this if there existed some $\theta \in \Omega$ and some θ' such that $\pi^0(\theta, \theta') = 1$ and $\pi^1((\theta, L), (\theta', H)) = 0$. The above condition guarantees that such a θ' does not exist.

tax rate. In a world in which policies are related through non-separabilities in preferences, the same phenomenon can arise for a different reason.[14] To illustrate this, consider an environment with public provision of a private good studied, for example, by Epple and Romano (1996), Fernandez and Rogerson (1997), and Gouveia (1996). Suppose that there are two homogeneous groups — rich and poor, with a single publicly provided private good, such as health care, financed by a proportional income tax. Suppose further that the constitution bans the private purchase of health care, meaning that citizens cannot "top-up" the publicly provided quantity. Consider the policy question of whether the constitutional ban should be lifted and the government should be granted the discretion to decide whether or not to impose the ban.

Allowing the government the power to relax the ban will lead to a rightward shift in the Pareto frontier. If the ban is relaxed, holding constant the rate of taxation, those who choose to top up in the private sector are better off, while those who choose not to are unaffected.[15] However, a version of Figure 1 can easily be generated. Suppose that the rich are in a majority so that a rich citizen always makes policy choices. In the status-quo, when topping up is banned, the rich desire a positive amount of publicly provided health care. This not withstanding, the income tax finance of this will mean that the rich will pay a higher share of the cost than the poor. Thus, the public program will disproportionately

[14] We thank Raquel Fernandez for drawing our attention to this possibility and suggesting the example to follow.

[15] This assumes that the publicly provided private good is produced at constant cost so that there are no pecuniary externalities.

benefit the poor. If the government is given the right to lift the ban, rich citizens will want to exercise this right and their demand for state funded health care will be diminished, even eliminated. This could well make the poor worse off and the result would be like a move from S to P in Figure 1. Thus, the introduction of the new instrument (the ability to relax the ban) leads to a dramatic change in the level of another policy, namely, publicly provided health care.

It should be clear that, while this result has a similar flavor, its logic is quite different from that developed in this paper. The key assumption is that the level of the new policy (i.e., whether or not the ban is in place) alters the demand for the other policy (publicly provided health care). Notice that this change occurs without any shift in the political equilibrium: the two parties put forward the same type of candidates throughout. It is purely a consequence of the non-separability of preferences with respect to the two policy instruments: the demand of the rich for publicly provided health care affects the level of the new policy (i.e., whether or not the ban is in place). Thus non-separabilities in preferences provide an additional reason why an analysis which takes into account political determination can produce dramatically different recommendations from a welfare economic analysis.

6.3 Rent Seeking

It is common to hear that introducing additional roles for government is bad because it leads to additional rent seeking. This happens if those whose welfare is affected by this instrument attempt to influence how it is used. Such influence activities will, so the argument goes,

be wasteful and this should properly be set against any benefits from an expanded role for government. Our model does not capture this because it assumes that policies are determined via a pure form of political competition where citizens have influence only through their votes and these votes are made by fully informed rational voters. Nonetheless, it would be straightforward to extend the analysis to investigate the impact of rent-seeking, although the outcome would be sensitive to modeling assumptions. We briefly consider two possibilities here.

Following Besley and Coate (1997b), we could suppose that the elected leader would be lobbied by interest groups after gaining office. Essentially, such groups would offer the policy-maker bribes in exchange for moving policy in a preferred direction. Citizens as voters would anticipate this lobbying and this might affect their preferences over candidates. This could change the political consequences of intervention. For example, if citizens who preferred a high level of the public good formed a lobby under state provision and were a large enough group, then any type of candidate would end-up choosing the same level of the public good.[16] Since all candidates would deliver the same public good outcome, only preferences toward redistribution would matter to voters and the middle class's preferred outcome would prevail. Hence, even though the public good would favor the high preference group, there would be no shifts in redistributive taxation. The bribes paid in equilibrium would be a form of redistribution, but should not properly be considered as waste.

[16] The reader is referred to Besley and Coate (1997b) for a detailed discussion of the workings of this type of model.

An alternative approach would be to follow Grossman and Helpman (1996) in supposing that lobby groups give campaign expenditures that influence how citizens vote. Interest groups then contribute to the campaigns of their preferred candidate to increase the probability that he or she wins. This leads parties to bias their selection of candidates towards types who attract interest group support. Supposing again, that the citizens who preferred a high level of the public good form a lobby under state provision, a party who did not select a type H candidate receives no campaign contributions and would lose votes. If the lobby were sufficiently powerful, then both parties would select a type H candidate. Again, political competition would reduce to one dimension with the middle class's preferred level of redistribution prevailing. Here, it would be legitimate to regard the resources used in lobbying as waste and the welfare loss from this should be considered when deciding whether to introduce the public good.

Both these formulations suggest that incorporating rent seeking lessens the likelihood of shifts in the status quo policy instruments. However, we assumed that only one group of citizens would lobby and that lobbying would take place only if state provision were undertaken. With existing lobbying activity over the status quo policy instruments, then the implications of introducing new interventions are likely to be more subtle. Moreover, introducing the new instrument may alter the composition of lobby groups in some way. Hence, it is not clear that levels of status quo policies would remain the same or even that the total amount of influence activities would increase. We leave it to future research to investigate these issues more fully.

6.4 Alternative Models of Policy Determination

The idea that new interventions can have spillovers on existing policies is not an artifact of our particular model of policy determination. Rather it is a feature of multi-dimensional political competition in representative democracies. From the considerable literature on multi-dimensional collective choice problems, it is clear that there are no good reasons for supposing that existing dimensions of policy should remain stable when the portfolio of available policies is expanded. Thus, spillover effects would be expected in any model which attempted to deal squarely with the multi-dimensional nature of political competition.[17] Only if policies were determined with separate elections on each issue might we not expect the kind of spillovers that we have identified.

6.5 Comparing Policy Regimes

Finally, we note that the lessons of our model for the analysis of the case for government intervention may apply more generally to the comparison of policy regimes. For example. Cremer and Pestieau (1998) compare two regimes for social security provision assuming that the policy parameters are determined in political equilibrium by the median voter. This analysis implicitly assumes that other policies are unaffected by which ever social security regime is in place. However, one could imagine shifts in voter coalitions on redistribution of the kind illustrated here. Similar issues might arise in discussing means testing versus

[17] Our earlier paper used a pure citizen-candidate approach to generate policy outcomes and showed that both non-majoritarian policy choices and shifts in redistributive policy could result from government intervention to provide a public good.

universal provision in anti-poverty programs and different regimes for education finance. Investigating whether the forces that we have illustrated are important for policy regime comparisons is an interesting avenue for further research.

7 Conclusion

When policies are determined in political equilibrium, evaluating the case for the government to use a particular policy instrument should involve a consideration of the political consequences of introducing that instrument. This is a central insight of the public choice literature. Existing attempts to consider the implications of accounting for political determination in policy analysis have taken a one-dimensional, majoritarian view. Here, we have grappled with the obvious reality that particular interventions are typically part of a broader portfolio of policy instruments and that, consequently, new interventions might have both spillover effects and produce non-majoritarian outcomes. The result is an improved understanding of when and how political determination interferes with a welfare economic analysis. The paper has provided insights into when the median voter approach may be appropriate and into the nature of the policy outcomes which emerge when it is not. It has also shown that the spillover effects on other instruments provide new arguments for introducing particular policy interventions. Even a policy instrument without an obvious welfare economic rationale can change voter coalitions and shift the policy equilibrium in a welfare improving direction.

Much remains to be done in terms of understanding the political consequences of new or

changed roles for government. Theoretically, the model of political competition presented here might usefully be applied to analyze the choice between alternative policy regimes in other contexts. It would also be interesting to explore such effects empirically. There are many instances in which technological or constitutional changes have changed the role of government and it would be interesting to investigate whether these changes could be shown to have had significant political consequences of the sort identified here.

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8 Appendix

Proof of Lemma 1: We begin with parts (i) and (ii). By definition

$$\Delta_R^M = v(t^*(M), M) - v(t^*(R), M),$$

and

$$\Delta_R^P - \Delta_M^P = v(t^*(M), P) - v(t^*(R), P).$$

So, recalling the definition of $v(t^*(\theta'), \theta)$ and defining the function

$$\begin{aligned}\xi(a) &= (1 - t^*(M))y(t^*(M), a) + t^*(M)\overline{y}(t^*(M)) - \phi(y(t^*(M), a)/a) - \\ &\quad [(1 - t^*(R))y(t^*(R), a) + t^*(R)\overline{y}(t^*(R)) - \phi(y(t^*(R), a)/a)],\end{aligned}$$

it is enough to show that $\xi(a_P) > \xi(a_M)$. Using the Envelope Theorem,

$$\xi'(a) = \frac{\phi'(y(t^*(M), a)/a)y(t^*(M), a)}{a^2} - \frac{\phi'(y(t^*(R), a)/a)y(t^*(R), a)}{a^2}.$$

Since $y(t^*(M), a) < y(t^*(R), a)$ and $\phi'' > 0$, this expression is negative. Hence the result. The proof of (ii) is similar.

For (iii), imagine changing the tax rate from the rich's preferred rate $t^*(R) = 0$, to the preferred rate of the middle class $t^*(M) > 0$. The gain to each middle class citizen (in units of the private good) is Δ_R^M; the gain to each poor citizen is $\Delta_R^P - \Delta_M^P$; and the loss to each rich citizen is Δ_M^R. The presence of deadweight loss implies that the sum of gains must be smaller than the sum of losses, so that

$$N^R\Delta_M^R < N^M\Delta_R^M + N^P[\Delta_R^P - \Delta_M^P].$$

Part (i) of the Lemma then implies that $N^R\Delta_M^R < (N^M + N^P)\Delta_R^M$ which, since $(N^M + N^P)/N^R > 1$ implies the result. ■

Proof of Proposition 2: To prove the proposition it suffices to show that, under the condition, a type (M, L) candidate is a Condorcet winner in the set of candidate types $\{P, M, R\} \times \{L, H\}$. Under these circumstances, it is clear that both parties choosing a type (M, L) candidate is the only possible political equilibrium. As observed prior to the Proposition, a type (M, L) candidate must defeat candidates of types (P, L) and (R, L) and candidates of type (M, H). Thus, it remains to show that a type (M, L) candidate also defeats candidates of type (P, H) and (R, H).

The condition implies that (M, H) citizens will vote for a (M, L) candidate over a (P, H) or a (R, H) candidate. By Lemma 1, it also implies that (P, H) citizens will vote for a (M, L) candidate over a (R, H) candidate and that (R, H) citizens will vote for a (M, L) candidate over a (P, H) candidate. Thus, a type (M, L) candidate will attract the support of all the middle class and poor in a race against a type (R, H) candidate and all the middle class and rich in a race against a type (P, H) candidate. This implies that a type (M, L) candidate must defeat candidates of type (P, H) and (R, H). ■

Proof of Proposition 3: Again, it is enough to show that, under the condition, a type (M, L) candidate must defeat candidates of type (P, H) and (R, H). The condition implies that (P, L) citizens will vote for a (M, L) candidate over a (P, H) candidate and that (R, L) citizens will vote for a (M, L) candidate over a (R, H) candidate. Thus a type (M, L)

candidate will receive the support of all citizens with low public good preferences in a race against a type (P, H) or (R, H) candidate. Since the majority of citizens have low public good preferences, this implies that a type (M, L) candidate must defeat candidates of type (P, H) and (R, H). ■

Proof of Proposition 4: We must demonstrate that, under the conditions of the Proposition, there is a unique political equilibrium in Regime 1 (σ_A, σ_B), such that $\sigma_A = \sigma_B$ and $\sigma_A(M, L) = \sigma_A(M. H) = \sigma_A(P, H) = 1/3$. We begin by describing the outcomes of races between the different candidate types. Outcomes of races between two distinct candidates who share either the same public good preferences or the same ability type are straightforward to compute. In the latter case, the candidate with low public good preferences wins. In the former case, if one of the candidates is middle class he wins. In a race between a poor and rich candidate, the poor candidate wins since the middle class vote for the poor candidate. This is a consequence of the assumption that $\Delta_P^M < \Delta_R^M$.

It remains to understand races between candidates who differ in both dimensions. As argued prior to the statement of the Proposition, we have that

$$\pi^1((M, L), (P, H)) = \pi^1((M, L), (R. H)) = 0.$$

Moreover, under the conditions of the Proposition,

$$\pi^1((M, H), (P, L)) = \pi^1((M, H), (R, L)) = \pi^1((R, H), (P, L)) = \pi^1((P, H), (R, L)) = 1.$$

This information is presented in Table 1, which describes the probability that Party A wins for all possible candidate pairs put up by the two parties.

Since there are no ties between any distinct pair of alternatives, we may use the Laffond, Laslier and Le-Breton result to conclude that there exists a unique political equilibrium. Thus, to prove the result we need only show that the proposed strategies constitute a political equilibrium. To see this, suppose that Party B is playing according to the proposed strategy and compute the payoff to Party A from each of its pure strategies. Using Table 1, it is straightforward to verify that the strategy (R, L) yields an expected payoff of -1; strategies (P, L) and (R, H) yields a payoff of $-1/3$; and strategies (P, H), (M, L) and (M, H) yield an expected payoff of 0. Thus, the proposed strategy is a best response for Party A. Since the game is symmetric, the proposed strategy is also a best response for Party B when Party A is playing according to it. We conclude that the proposed strategies are a political equilibrium. ■

Proof of Proposition 5: We must demonstrate that, under the conditions of the Proposition, there is a unique political equilibrium in Regime 1, (σ_A, σ_B) such that $\sigma_A = \sigma_B$ and $\sigma_A(M, L) = \sigma_A(R, L) = \sigma_A(R, H) = 1/3$. As in the proof of the previous proposition, we begin by describing the outcomes of races between the different candidate types. Outcomes of races between two distinct candidates who share either the same public good preferences or the same ability type are as described in the proof of Proposition 4 except that in a race between a poor and rich candidate, the rich candidate wins since the middle class vote for the rich candidate.

It remains to understand races between candidates who differ in both dimensions. Since middle class citizens vote according to their redistributive preferences in races involving poor

candidates, we have that

$$\pi^1((M,L),(P,H)) = \pi^1((M,H),(P,L)) = \pi^1((R,L),(P,H)) = \pi^1((R,H),(P,L)) = 1.$$

Moreover, as argued prior to the Proposition,

$$\pi^1((R,L),(M,H)) = \pi^1((R,H),(M,L)) = 1.$$

This information is presented in Table 2, which describes the probability that Party A wins for all possible candidate pairs put up by the two parties.

Since there are no ties between any distinct pair of alternatives, we may again use the Laffond, Laslier and Le-Breton result to conclude that there exists a unique political equilibrium. Thus, to prove the result we need only show that the proposed strategies constitute a political equilibrium. To see this, suppose that Party B is playing according to the proposed strategy and compute the payoff to Party A from each of its pure strategies. Using Table 2. it is straightforward to verify that the strategies (P,L) and (P,H) yield an expected payoff of -1; the strategy (M,H) yields a payoff of $-1/3$; and the strategies (M,L), (R,L) and (R,H) yield an expected payoff of 0. Thus, the proposed strategy is a best response for Party A. Since the game is symmetric, the proposed strategy is also a best response for Party B when Party A is playing according to it. We conclude that the proposed strategies are a political equilibrium. ■

Party B

Party A	(P,L)	(P,H)	(M,L)	(M,H)	(R,L)	(R,H)
(P,L)	$\frac{1}{2}$	1	0	0	1	0
(P,H)	0	$\frac{1}{2}$	1	0	1	1
(M,L)	1	0	$\frac{1}{2}$	1	1	0
(M,H)	1	1	0	$\frac{1}{2}$	1	1
(R,L)	0	0	0	0	$\frac{1}{2}$	1
(R,H)	1	0	1	0	0	$\frac{1}{2}$

TABLE 1

Party B

Party A	(P,L)	(P,H)	(M,L)	(M,H)	(R,L)	(R,H)
(P,L)	$\frac{1}{2}$	1	0	0	0	0
(P,H)	0	$\frac{1}{2}$	0	0	0	0
(M,L)	1	1	$\frac{1}{2}$	1	1	0
(M,H)	1	1	0	$\frac{1}{2}$	0	1
(R,L)	1	1	0	1	$\frac{1}{2}$	1
(R,H)	1	1	1	0	0	$\frac{1}{2}$

TABLE 2

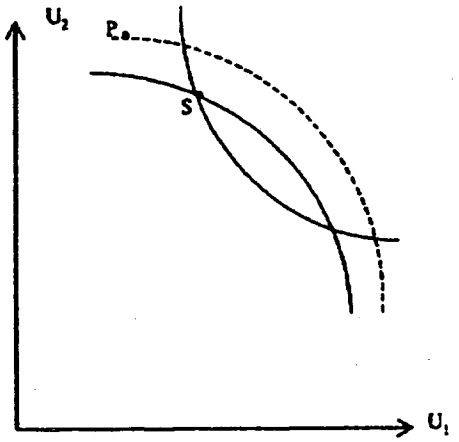

Figure 1

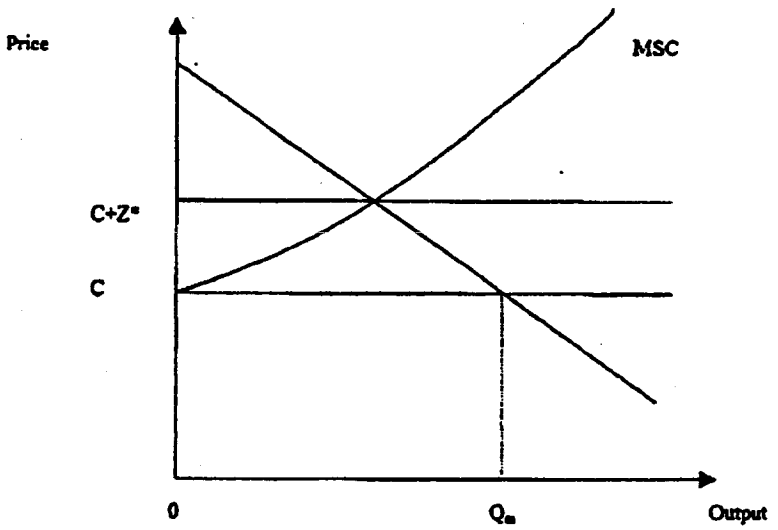

FIGURE 2