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### **ABSTRACT**

A large recent literature shows that strategic interactions among actors with conflicting objectives can produce inefficient political decisions. This paper investigates an alternative explanation of such decisions: if individuals' errors in assessing the likely effects of proposed policies are correlated, democratic decision-making can produce inefficient outcomes even in the absence of distributional conflicts or heterogeneous preferences. Choosing candidates from among the best informed members of the population does not remedy the problems created by such errors, but subsidizing information and exposing representatives to information after their election do. Concentration of power has ambiguous effects. Finally, the presence of correlated errors tends to create multiple equilibria in political institutions.

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## I. INTRODUCTION

Political decisions often have important effects on the allocation of resources. If, for example, one wants to understand the extent of international trade, the allocation of resources to pollution abatement, or the division of an economy's resources between consumption and investment, it is necessary to understand the determinants of political decisions concerning trade restrictions, environmental regulation, and tax policies and budget deficits. Moreover, political decisions that affect resource allocations often appear inefficient. For example, trade restrictions are common, environmental regulation relies heavily on command and control, and many countries run large, persistent budget deficits.

These facts have motivated a large literature investigating the possibility that strategic interactions among individuals with divergent interests or preferences can give rise to inefficient political outcomes. Persson and Svensson (1989) and Tabellini and Alesina (1990), for example, show that an elected leader's inability to make a binding agreement with his or her successor can cause the leader to accumulate an inefficiently high amount of debt to restrain the successor's spending. Coate and Morris (1995) and Rogoff (1990) show how the combination of voters' uncertainty about politicians' honesty or competence and their inability to commit to their future voting policies can cause politicians to adopt inefficient policies to try to signal that

they have desirable characteristics. Similarly, Shleifer and Vishny (1994) and others show how the interaction of a small number of individuals with much to gain from a policy with a large number with little to lose, coupled with enforcement problems or social sanctions involving direct transfers, can lead to the adoption of inefficient policies that benefit the few at the expense of the many.

But in their informal discussions, and in their activities as teachers and policy advisers, economists often suggest that political decisions resulting in seemingly inefficient allocations stem not from strategic interactions, but from ignorance. In this view, price controls, command-and-control approaches to environmental regulation, and other government interventions are so prevalent in part because voters and politicians do not understand the efficiency benefits of market mechanisms and the distortions and rent-seeking created by regulation.

Such arguments rest on the idea that individuals do not understand the workings of the economy, and thus appear to depend on irrational or biased beliefs. As a result, economists have been reluctant to rely on them for explanations of political decisions. Tabellini and Alesina, for example, dismiss the idea that persistent deficits might arise from voters' misunderstandings on the grounds that "this notion is difficult to reconcile with standard assumptions of rationality." Similarly, Rodrik (1996) divides candidate explanations of why governments sometimes embark on unsustainable macroeconomic policies into ones based on "some kind of coordination problem" among agents who behave "rationally and non-myopically" and those "attributing myopia or irrationality to the main political actors."

Models of strategic interactions of knowledgeable individuals are a natural starting point for efforts to understand apparently inefficient political decisions. Yet such strategic interactions may not be the only force at work. Given how central

political decisions are to resource allocations and how often those decisions appear to violate standard prescriptions for efficiency, it is reasonable to explore a wide range of possible explanations for those decisions. The purpose of this paper is therefore to take a first step in the direction of taking seriously the fact that individuals do not have complete knowledge of how the economy functions, and to see whether this provides any insights about the source and nature of seemingly inefficient political decisions.

The first result of the paper is that irrationality is not needed for incomplete knowledge to give rise to inefficient political outcomes. All that is required is imperfect information of a particular form: individuals' errors must be correlated with one another. I refer to such correlated errors as misconceptions.

The idea that there may be misconceptions should be uncontroversial. Since each individual does not know others' errors, misconceptions do not involve irrationality. And most economists' experiences provide direct evidence of misconceptions: economics students and non-economists appear on average to underestimate the importance of incentives and the distortions caused by holding prices below their market-clearing levels, to overestimate the probability that simple mercantilist views of trade are correct, and so on.

Even more clear-cut evidence of misconceptions can be found in basic physics, where there is little doubt about what is correct and where it is often fairly straightforward to determine individuals' beliefs. A large literature documents numerous examples of correlated errors in individuals' understanding of the laws of physics.<sup>1</sup> One standard example involves beliefs about the path that an object on a

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<sup>1</sup> For examples from mechanics, see McCloskey, Caramazza, and Green (1980), Halloun and Hestenes (1985), and Hestenes, Wells, and Swackhamer (1992). For examples from optics and electricity, see Goldberg and McDermott (1987) and Cohen, Eylon, and Ganiel (1983).

string that is being spun in a circle will follow if it is released. Individuals are much more likely to predict that it will continue to curve in the same direction as before than to make the opposite error of predicting that it will curve in the other direction. Another common example concerns views about the relative speed of a light and a heavy object dropped in a vacuum: individuals often incorrectly predict that the heavy object will fall faster, but they rarely predict that it will fall more slowly. The fact that there is clear evidence of misconceptions concerning elementary questions of physics suggests that we should at least be open to the possibility that there are misconceptions concerning more complicated questions.

Furthermore, misconceptions may be particularly important to political decisions. Since each individual's impact on political outcomes is small, individuals' incentives to gather and evaluate information about alternative policies or candidates are small. Similarly, their incentives to determine what types of institutions tend to produce desirable outcomes in the face of the possibility of misconceptions, and to support the adoption of such institutions, are also small. Thus it is plausible that in the political arena, individuals take existing institutions as given and support the candidates or policies that a superficial examination of the evidence suggests will produce the more desirable outcomes. As a result, their errors may be especially large, and it is particularly likely that they will not take corrective action even if misconceptions have large effects.

This paper therefore analyzes the effects of correlated errors in individuals' beliefs on political decisions under different institutional arrangements. To keep matters simple, I neglect issues of distributional conflicts and heterogeneous preferences that are the usual focus of political analysis. Rather, following such authors as Condorcet (1785) and Piketty (1994), I simplify the analysis by assuming

that the decisions that must be made concern policies that affect each individual's utility identically. I assume that individuals do not have full information about what those effects will be. The errors in their beliefs may have a common component, and the amount of information individuals have may be heterogeneous.

After Section II lays out my assumptions about individuals' information, Section III analyzes the baseline case where the decision of whether to adopt a policy is made by referendum. This analysis demonstrates the straightforward points that misconceptions can lead to the adoption of inefficient policies and that voting can be an inefficient way of aggregating information.

Section IV then considers the effects of various alternative institutions. I find that under plausible assumptions, letting decisions be made by an elected representative rather than by a referendum has no impact on outcomes even if candidates for office have been exposed to more information than the average voter has. The reason is that even among those who have been exposed to information, there will be some who support the policies that are most popular with the voters, and it is these individuals who are elected. But I find that exposing elected representatives to additional information after their election improves political outcomes.

Section IV also investigates the effects of subsidies to information dissemination and non-democratic institutions that place decision-making in the hands of a limited number of individuals. Subsidies to information, not surprisingly, improve political outcomes, but concentration of power has ambiguous effects.

Section V then turns to the determination of political institutions. I show that there is a force tending to create multiple equilibria in institutions: since individuals evaluate institutions at least partly on the basis of the outcomes they produce, individuals who support a policy also tend to support institutions that give rise to the

policy. Thus the political process need not lead to the adoption of institutions that produce desirable outcomes. But if such institutions do arise, there is a force acting to make them self-preserving.

Finally, Section VI offers concluding remarks and discusses possible extensions.

## II. BASIC ASSUMPTIONS

Society consists of a continuum of individuals indexed by  $i \in [0,1]$ . The society must choose between two possible policies. A given policy provides every individual with the same utility. I normalize the utility provided by the first policy to zero, and let  $U$  denote the utility provided by the second. I refer to the first policy as the status quo, and to the second as the proposed change.

By assuming that each individual receives the same utility from a given outcome, I eliminate all distributional issues and simplify the political problem to that of choosing the policy that is best for everyone. And by assuming that there are only two possible outcomes, I eliminate all of the complications that arise in political models with three or more choices.<sup>2</sup>

The central assumption of the model is that individuals do not have perfect

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<sup>2</sup> Most of the results in the paper also hold in a model where the choice to be made concerns the level of some continuous variable  $X$ , where social welfare is single-peaked in  $X$ , and where individuals receive signals of the optimal value of  $X$ . These assumptions imply that the value of  $X$  that the median voter believes is optimal wins a two-way contest against any other value of  $X$ . But to ensure that this value is in fact chosen by the political process, it is necessary to add assumptions that imply that voters are presented with only two choices and that one of them is the median voter's preferred value. Since those assumptions complicate the analysis without adding important insights, I focus on the simpler case where there are only two possible policies.

information about the utility the proposed change would provide. Instead they receive signals of  $U$ . An individual can receive  $N$  signals at a utility cost of  $C(N)$ . I assume that  $C(1) = 0$ , so that individuals receive at least one signal. An individual's initial signal can be thought of as the policy's intuitive appeal to that individual. I also assume that  $C'(N) > 0$  and  $C''(N) > 0$  for  $N \geq 1$ , and that  $\lim_{N \rightarrow \infty} C'(N) = \infty$ .<sup>3</sup>

Crucially, the difference between the signal an individual receives and the true benefit of the proposed policy is not independent across individuals. My informational assumptions are easiest to describe by starting with the case where each individual receives just one signal. In this case, individual  $i$ 's signal of the policy's benefit is given by  $S_i^1 = U + e^1 + v_i^1$ .  $e^1$  is the common component of individuals' imperfect knowledge of the proposed policy's utility, and the  $v_i^1$ 's are the idiosyncratic component.  $U$ ,  $e^1$ , and the  $v_i^1$ 's all have mean zero, and they are mutually independent. In addition, for simplicity they are assumed to be normally distributed.

What I refer to as a misconception is simply a non-zero draw of  $e^1$ . When  $e^1$  differs from zero, individuals' estimates of the policy's benefit on average differ from the truth. Yet those estimates are optimal given individuals' information. That is, a misconception is not any type of bias, but simply a correlation across individuals in their rational errors in assessing the likely consequences of the proposed policy.

My assumptions about additional signals are a natural extension of the assumptions about the first signal. Individual  $i$ 's  $j^{\text{th}}$  signal is  $S_i^j = U + e^j + v_i^j$ . The  $e$ 's and  $v$ 's are i.i.d., and they are independent of one another and of  $U$ .

My model, like most other political models, does not explain high levels of

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<sup>3</sup> Since the number of signals an individual receives must be an integer, strictly speaking  $C(N)$  is defined only for integer values of  $N$ . It simplifies the exposition, however, to treat  $N$  as continuous. All of the assumptions and results of the paper can easily be restated to account for the fact that  $N$  must be an integer.

voter participation. If many individuals vote, each individual's chance of affecting the outcome is extremely small. Even a very small cost to voting therefore prevents high participation from being an equilibrium. Thus explaining why so many people vote requires positing that they get some type of direct utility from voting. This is the approach that I follow.

Further, as Matsusaka (1995) shows, patterns of voting behavior are inconsistent with the view that it is the mere act of voting that generates utility. Individuals are more likely to vote when they have more information about the candidates or issues, and when they feel more strongly about the outcome. To capture this, I assume that the utility an individual gets from voting depends on the amount of information he or she has. Specifically, I assume that the utility from voting is given by  $B(N)$ . Thus, the utility of an individual with  $N$  units of information is  $B(N) - C(N)$  under the status quo, and  $[B(N) - C(N)] + U$  under the proposed change. I assume that  $B(N) > 0$  for  $N \geq 1$ . Together with the assumption that  $C(1) = 0$ , this ensures that everyone chooses to vote. I also assume that  $B'(N) > 0$  and  $B''(N) < 0$  for  $N \geq 1$ , and that  $\lim_{N \rightarrow \infty} B'(N) = 0$ .

### III. DECISION-MAKING BY REFERENDUM

This section considers the baseline case where the proposed policy is put to a direct vote. Each individual votes for or against the proposal, and it is adopted if and only if it receives a majority of the votes.

Individuals choose how much information to acquire to maximize  $B(N) - C(N)$ . I let  $N^{\text{DEMO}}$  denote the resulting value of  $N$ ; thus  $N^{\text{DEMO}}$  is defined by  $B'(N^{\text{DEMO}}) -$

$C'(N^{\text{DEMO}}) = 0$ . My assumptions about  $B(\bullet)$  and  $C(\bullet)$  ensure that  $N^{\text{DEMO}} \geq 1$ .

Individuals then vote on the basis of their beliefs about how the proposed change would affect social welfare. Given my distributional assumptions, this means that each individual votes on the basis of the sign of his or her average signal: an individual whose average signal is positive votes for the policy, and one whose average signal is negative votes against.

Given this discussion, it is clear that the outcome of the referendum need not be the one that is best for social welfare. Recall that the distribution of the idiosyncratic component of voters' signals -- the  $v_i^j$ 's -- is symmetric around zero. Thus voters' average signals are distributed symmetrically around  $U + \bar{e}$ , where  $\bar{e}$  is the average common component of the error in the first  $N^{\text{DEMO}}$  signals. And since there is a continuum of voters, the majority have a signal of the same sign as  $U + \bar{e}$ . Thus the policy is adopted if  $U + \bar{e}$  is positive, and rejected if it is negative. As long as the variance of  $e$  is strictly positive,  $U + \bar{e}$  may not have the same sign as  $U$  -- that is, the outcome of the referendum may not be the most desirable one.

The presence of a small number of more informed individuals does not change this result. If there is a set of individuals of measure zero who face lower costs of acquiring information, and who therefore have higher values of  $N$ , the outcome of the referendum is unchanged.

These results illustrate the fact that the political process can produce inefficient outcomes not because of strategic interactions among agents with conflicting preferences, but because voters may have incorrect beliefs about the merits of different policies. More importantly, they show that voting is an imperfect way of aggregating information. A referendum places the same weight on all individuals' votes regardless of how informed they are. And voting provides no mechanism for

the less informed to learn the views of the more informed.

It might appear that the less informed will respond to this problem by abstaining, thereby leaving the decision to the well informed. But this argument presumes that individuals' decisions of whether to vote are determined by the possibility that their behavior may affect the outcome. This presumption is contradicted by the observation that individuals vote despite the fact that their chances of affecting outcomes are minute. Given this fact, there is no basis for ruling out the possibility that individuals vote even in situations where their votes on average produce worse results. The fact that each individual's role in the political process is small also means that individuals have only small incentives to investigate how their participation affects the quality of outcomes. Thus they may not be aware that their voting is on average leading to less desirable outcomes.<sup>4</sup>

#### IV. OUTCOMES UNDER DIFFERENT INSTITUTIONS

This section analyzes how various arrangements other than direct referendum affect the outcome of the political process. The next section briefly discusses the determination of those arrangements.

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<sup>4</sup> As Feddersen and Pesendorfer (1996) observe, the fact that individuals often vote on some items on a ballot while abstaining on others suggests that voters do sometimes abstain in order to leave decisions to the better informed. But we know that voters must get some utility from participating in the political process, and that they have only minuscule incentives to compute the impact of their choice of whether to vote on the likelihood that the better outcome is chosen. Thus there is no reason to presume that they abstain the optimal amount from the point of view of maximizing the probability that elections produce the most desirable outcome. Indeed, Feddersen and Pesendorfer are able to obtain realistic levels of abstention only by assuming that many voters automatically support a particular outcome.

**Representative Democracy.** Political decisions are typically made not directly by voters, but by representatives they elect. Candidates for office are likely to be exposed to more information than the average voter is. For example, since their influence over policy decisions is larger, their incentives to acquire information are greater.

My focus is on possible difficulties in arriving at desirable political decisions even in the absence of conflicting interests. I therefore assume that holding office only entitles an individual to decide whether to adopt the policy; it does not provide the individual with any direct utility or any means of furthering his or her self-interest. Specifically, following Besley and Coate (1997), I assume that candidates are simply voters who choose to run for office. But I allow for the possibility that potential candidates are drawn from a subset of voters with a higher  $B(\bullet)$  function or a lower  $C(\bullet)$  function. Even in this case, however, I assume that there is a large number -- indeed, a continuum -- of potential candidates. Finally, I assume that all potential candidates have the same  $B(\bullet)$  and  $C(\bullet)$  functions, and thus that they all have the same value of  $N$ , denoted  $N^{\text{CAND}}$ .

Following Besley and Coate, I consider a three-stage game where potential candidates first decide whether to run for office and what platform to run on, voters then decide which of the announced candidates to vote for, and finally the candidate who receives the most votes decides whether to adopt the proposed policy. As Besley and Coate emphasize, this game typically has many Nash equilibria. I begin by describing one simple equilibrium, and then discuss a potential complication. The equilibrium I consider is for one advocate of each position to run. Specifically, one individual whose average signal is  $X_0$  and another whose average signal is  $-X_0$  become candidates, where  $X_0 > 0$ . Voters then vote on the basis of their signals, and the

winning candidate implements his or her preferred policy.

There are two key points to note to verify that this is a Nash equilibrium. First, because the pool of potential candidates is large, then -- no matter how large  $N^{\text{CAND}}$  is -- there are always potential candidates whose average signals are  $X_0$  and  $-X_0$ . Second, because the two candidates' signals are always the same, their signals provide no information about  $U$ . As a result, it is optimal for voters to vote on the basis of the signs of their average signals. The outcome of the election thus conveys to the winning candidate what fraction of the population has an average signal that is positive, and hence causes him or her to implement the policy that the majority support. Thus if, for example, the supporter of the proposed policy wins, he or she knows that a majority of individuals have average signals that are positive. The winner's conditional expectation of  $U$  is therefore positive, and so he or she implements the policy.

The last step in verifying the equilibrium is to check whether any candidate has an incentive to enter or leave the race. If one candidate withdraws, the other is unopposed, and can thus learn nothing about voters' signals (recall that everyone is assumed to vote). But it is strictly better to have the decision made on the basis of voters' signals than on the basis of no information at all. Thus neither candidate will withdraw. And since there are always supporters and opponents of the proposed policy, it is an equilibrium for voters not to revise their estimates of  $U$  in the event that a third candidate enters, or to vote for such a candidate. Thus it is an equilibrium for no other candidates to enter.

In short, there is an equilibrium where the switch from a referendum to representative democracy does not change the fact that voting is a poor way of aggregating information. This is true even if the candidates are drawn from a

particularly well-informed segment of the population. The reason is simply that even among the best informed, there are both supporters and opponents of a proposed policy; as a result, it is an individual who supports the position that is most popular with the voters who is chosen as the representative.

There are, however, other equilibria in which voters do learn something about well-informed individuals' information. Suppose, for example, that each well-informed individual enters the race in support of the policy that his or her average signal suggests is best. Then voters learn what fraction of well-informed individuals have average signals that are positive; thus they learn the sign of  $U + \bar{e}^{\text{CAND}}$ , where  $\bar{e}^{\text{CAND}}$  is the average common component of the error in the well-informed individuals'  $N^{\text{CAND}}$  signals. This information dominates each voter's own information about  $U$ . Thus each voter votes for a candidate who supports the policy that a majority of the well-informed support.

There are two responses to this observation, one narrow and one broad. The narrow response is that, even though there are other equilibria, it is still the case that there is an equilibrium in which the switch from a referendum to representative democracy has no effect. The broad response is that the fact that there are always some potential candidates who support the policies that are most popular with the voters means that there is a natural reason that representative democracy is unlikely to improve political outcomes. Indeed, the idea that voters and relatively uninformed potential candidates discount their direct signals in favor of inferences drawn from the behavior of the well-informed requires a level of hyperrationality that seems implausible. In many cases, individuals' different signals are best thought of not as different numerical draws from a known common distribution, but as differences in beliefs resulting from different abilities to process information (Rubinstein, 1993) or

from different worldviews stemming from a lifetime of different experiences (Kandel and Pearson, 1995). Realistically, as Kandel and Pearson emphasize, in such cases many individuals are likely to maintain their beliefs even in the face of the knowledge that there are others with different views.

To see the importance of this observation, suppose that there is a subset of the population who are naive -- that is, who form their estimates of  $U$  based only on their own signals. Then if the remaining individuals vote for a supporter of the policy that a majority of the candidates support, the naive individuals have an incentive to become candidates: entering the race attracts votes for the position they support. As a result, it is an equilibrium not just for the well-informed individuals to become candidates, but for the naive individuals as well. As a result, the voters who are willing to discount their signals in favor of what they can infer from others' behavior no longer learn the sign of  $U + \bar{\epsilon}^{\text{CAND}}$ . If there are many more naive than well-informed individuals, for example, what voters obtain information about is mainly the sign of  $U$  plus the average error of the naive individuals. In this case, the switch from a referendum to representative democracy has little impact on the decision of whether to adopt the proposed policy.

**Dictatorship.** The underlying source of imperfect political decisions in this analysis is that each voter has only a small influence on those decisions, and thus only a small incentive to acquire information about proposed policies. One way to address this problem is to give individuals more influence over political decisions. But it is not possible to increase some individuals' influence without reducing others'. Thus the only way to make some individuals more influential is to make the distribution of political power unequal.

To see how concentration of power affects political decisions in the model, I

begin by considering the extreme case where decisions are made by a single exogenously chosen individual. Such an arrangement could correspond to dictatorship, hereditary monarchy, or decision-making by an individual chosen by lot.

Since the proposed policy is assumed to have the same effect on everyone's utility, there are no possibilities for the decision-maker to adopt a policy that benefits himself or herself at others' expense. Thus the analysis will tend to understate the disadvantages of dictatorship. Counterbalancing this, I focus on the baseline case where the decision-maker acts to maximize his or her narrowly defined self-interest and puts no weight on the fact that the policy affects all other individuals. By making this assumption, I potentially understate the decision-maker's incentive to acquire information, and thus tend to understate the benefits of dictatorship.

To analyze the effects of dictatorship, it is useful to define  $W(N,M)$  to be the expected utility from the policy when the decision of whether to adopt it is made by majority vote among  $M$  individuals with  $N$  pieces of information. Specifically, letting  $\text{Med}(N,M)$  denote the median value of individuals' estimates of  $U$  when there are  $M$  individuals each with  $N$  signals,  $W(N,M)$  is given by

$$W(N,M) = \text{Prob}[\text{Med}(N,M) > 0]E[U \mid \text{Med}(N,M) > 0] . \quad (1)$$

It is straightforward to show that  $W(N,M)$  is increasing in  $N$  and non-decreasing in  $M$ . In addition, I let  $W^*$  denote the expected benefit from the policy under perfect information:

$$W^* = \text{Prob}[U > 0]E[U \mid U > 0] . \quad (2)$$

The decision-maker's choice determines whether the policy is adopted. His or her expected utility as a function of the number of signals is therefore  $[B(N) - C(N)] + W(N,1)$ .<sup>5</sup> Thus the decision-maker's choice of the number of signals to obtain,  $N^{\text{DICT}}$ , is defined by  $[B'(N^{\text{DICT}}) - C'(N^{\text{DICT}})] + W_N(N^{\text{DICT}},1) = 0$ ; the resulting level of expected social welfare is  $W(N^{\text{DICT}},1)$ . For comparison, recall that the number of signals each voter obtains with a referendum system,  $N^{\text{DEMO}}$ , is defined by  $B'(N^{\text{DEMO}}) - C'(N^{\text{DEMO}}) = 0$ . In this case, expected social welfare is  $[B(N^{\text{DEMO}}) - C(N^{\text{DEMO}})] + W(N^{\text{DEMO}},\infty)$ .

This analysis identifies one advantage and two disadvantages of dictatorship. The advantage is that a sole decision-maker has a greater incentive to acquire information than individuals in a democracy do. That is, because  $W(N,M)$  is increasing in  $N$ ,  $N^{\text{DICT}}$  exceeds  $N^{\text{DEMO}}$ . And the fact that  $W(N,M)$  is increasing in  $N$  implies that this increase in information tends to improve the political decision.

The first disadvantage of dictatorship is that when a single individual decides whether a policy is to be adopted, his or her idiosyncratic views of the policy's merits -- the  $v^j$ 's -- affect the decision. In terms of the model, the fact that  $W(N,M)$  is non-decreasing in  $M$  means that the reduction in the number of decision-makers tends to worsen political decisions.

The second disadvantage of dictatorship is that it eliminates the utility benefits of political participation. Recall that the fact that voter participation is so high makes sense only if individuals' participation affects their utility not just through its impact on outcomes, but also directly. The switch to dictatorship eliminates this source of

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<sup>5</sup> If the decision-maker puts some weight on others' welfare, his or her objective function is  $[B(N) - C(N)] + (1 + \gamma)W(N,1)$ , where  $\gamma$  is the weight the decision-maker puts on the representative individual's welfare.

utility. That is, the switch changes expected social welfare not just by  $W(N^{\text{DICT}}, 1) - W(N^{\text{DEMO}}, \infty)$ , but also by  $-[B(N^{\text{DEMO}}) - C(N^{\text{DEMO}})]$ .

It is not possible to determine whether the overall effect of dictatorship is positive or negative. If the idiosyncratic component of the signals (the  $v_i^j$ 's) and the direct benefits of participation ( $B(N^{\text{DEMO}}) - C(N^{\text{DEMO}})$ ) are sufficiently small, dictatorship is preferable to democracy. As the variance of the  $v_i^j$ 's approaches zero, the number of decision-makers becomes irrelevant to the decision of whether to adopt the policy. Thus dictatorship's effect on the expected utility from the policy approaches  $W(N^{\text{DICT}}, 1) - W(N^{\text{DEMO}}, 1)$ , which is necessarily positive. And as the direct utility of participation approaches zero, expected social welfare approaches expected utility from the policy.

If  $C''(N)$  is sufficiently large, on the other hand, democracy is preferable to dictatorship. As  $C''(N)$  approaches infinity,  $N^{\text{DICT}}$  approaches  $N^{\text{DEMO}}$ . Thus the only benefit of dictatorship vanishes.

One possibility is that dictatorship raises expected utility from the policy, but nonetheless lowers expected social welfare. That is, it could be that  $W(N^{\text{DICT}}, 1) - W(N^{\text{DEMO}}, \infty)$  is positive but less than  $B(N^{\text{DEMO}}) - C(N^{\text{DEMO}})$ . In this case, the argument for democracy is not that it produces better political decisions, but that broad political participation is desirable in its own right.

**Oligarchy.** The consequences of a system where the number of decision-makers is finite but not necessarily equal to one are similar to those of dictatorship. With  $M$  decision-makers, expected social welfare is  $W(N(M), M)$ , where  $N(M)$  is the number of signals each decision-maker obtains when there are  $M$  of them.  $N(M)$  is

decreasing in  $M$ .<sup>6</sup> The impact of a change in  $M$  on expected social welfare is therefore  $W_N(N(M),M)N'(M) + W_M(N(M),M)$ , where subscripts denote partial derivatives. The first term of this expression is negative and the second positive. As with the switch from democracy to dictatorship, the sign of the sum of the two terms is ambiguous.

Although one cannot reach any general conclusions about the optimal number of decision-makers in this model, three points are worth noting. First, there are cranks in the world: some individuals advocate policies that the best available evidence suggests would be disastrous and that the vast majority of voters oppose. This suggests that the variance of  $v$  is extremely large, and thus that the optimal number of decision-makers is almost certainly greater than one.

Second, because majority voting gives no more weight to an individual with a strong preference for a policy than to one with a weak preference, it does not take many individuals to greatly dilute the influence of a handful of cranks. With  $M$  decision-makers, the decision of whether to adopt the policy is determined by the sign not of  $U + \bar{e}$ , but of  $U + \bar{e}$  plus the median value of  $\bar{v}$ . Suppose that  $M$  is large enough that the central limit theorem can be used to approximate where in the overall distribution of  $\bar{v}$  the median individual's  $\bar{v}$  falls. Under this assumption, the percentile of the overall distribution of  $\bar{v}$  where the median voter's value lies is approximately normally distributed with a mean of 50 and a standard deviation of  $50/\sqrt{M}$ . With 100 decision-makers, for example, the median  $\bar{v}$  has a 95% chance of being between the 40th and 60th percentiles of  $\bar{v}$ 's distribution, and is virtually certain ( $p \approx 0.9999$ ) to

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<sup>6</sup> Formally,  $N(M)$  is the Nash equilibrium value of  $N$  for the game where each of  $M$  decision-makers chooses his or her  $N$  to maximize  $B(N) - C(N)$  plus expected utility from the policy, taking others'  $N$ 's as given. As  $M$  rises, each individual's impact on expected utility from the policy falls. One can show that as a result,  $N$  falls.

be between the 30th and 70th percentiles. With 10,000 decision-makers, the median  $\bar{v}$  is virtually certain to lie between the 48th and 52nd percentiles of  $\bar{v}$ 's distribution.

Thus, unless the density of  $\bar{v}$  in the vicinity of zero is small, a moderate number of decision-makers is enough to make it almost certain that the median value of the decision-makers' signals (their  $U + \bar{e} + \bar{v}$ 's) is very close to the common value of  $U + \bar{e}$ . Thus in cases where  $U + \bar{e}$  is large in absolute value, it is very unlikely that the  $\bar{v}$ 's will affect the majority's preference. It follows that just a moderate number of decision-makers is enough to almost eliminate the negative effect of concentrated power on political decisions in this analysis. And with only a moderate number of decision-makers, each one has a non-zero (though small) probability of affecting the outcome. Thus the decision-makers acquire more information than they would under pure democracy.

In sum, in terms of the considerations analyzed in this paper, the number of decision-makers that maximizes the expected benefit of the policy is likely to be more than one but much less than the population of a typical country. An actual arrangement that would come close to this idea would be to choose the desired number of individuals for a particular decision or election at random from the full population.

The third point to make about the optimal number of decision-makers is that the direct utility of participation is again relevant. Since there is a continuum of individuals, the average direct utility from participation with any finite number of decision-makers is zero. As a result, it may be that having a small number of decision-makers produces the best outcome in terms of the average quality of political decisions, but that having full participation produces the best outcome in terms of social welfare.

**Subsidies to Information Acquisition and Dissemination.** The next type of institutional feature I consider is straightforward. Better information about proposed policies improves political decisions. Thus policies that make information more easily available and that encourage individuals to acquire information produce better outcomes.

An increase in the amount of information an individual possesses raises the likelihood that the policy chosen is the one that yields higher welfare; this benefits all individuals. Thus information acquisition has a positive externality. We can therefore say not just that subsidies to information on average improve political decisions, but that over some range they raise expected social welfare.

Specifically, with a continuum of voters, each individual takes expected welfare from the policy as given. Each individual therefore chooses  $N$  so that  $B'(N) - C'(N) = 0$ ; that is, each individual chooses  $N = N^{\text{DEMO}}$ . The resulting level of expected social welfare is  $[B(N^{\text{DEMO}}) - C(N^{\text{DEMO}})] + W(N^{\text{DEMO}}, \infty)$ . In this situation, a coordinated increase in  $N$  makes everyone better off. The derivative of the representative individual's utility with respect to the common value of  $N$  is  $B'(N) - C'(N)$  (which is zero at  $N^{\text{DEMO}}$ ) plus  $W_N(N, \infty)$  (which is positive).

This analysis implies that the optimal subsidy for acquiring  $N$  units of information takes the form  $W(N, \infty) - K$ , where  $K$  is any constant. With this subsidy, each individual chooses  $N$  so that  $[B'(N) - C'(N)] + W_N(N, \infty) = 0$ . Thus, this policy leads to the welfare-maximizing choice of  $N$ .

Examples of policies that support information acquisition and dissemination include subsidies to non-partisan political organizations, to the broadcast of political speeches and debates, and to the news media. More subtle examples of policies that have similar effects are ones that give well-informed individuals a greater voice in

elections. Consider, for example, systems where the endorsements of news organizations, interest groups, and other political figures are important to the funding that candidates receive, or are widely publicized and influence voters' decisions. Individuals making endorsements, like potential candidates for office, tend to be better informed than the average voter. Thus their actions help candidates supporting policies that yield higher social welfare, and thus improve political outcomes.

**Educating Elected Representatives.** The problem that keeps the provision of information to potential candidates before an election from improving political outcomes does not arise when the information is provided after the candidates are elected. Additional information on average improves elected representatives' understanding of which policy is better for social welfare. And because representatives want to raise social welfare and have the ability to do so, they will act on the basis of this information. Thus devices that increase the amount of information representatives obtain after their election -- such as formal training programs, legislative hearings, official roles for panels of expert advisers, and a professional civil service -- improve political decisions.

Indeed, under the assumptions of the model, ex post education provides a way of ensuring that the correct decision concerning the policy is always reached. Specifically, consider any system where one individual -- whether chosen by an election or by some other means -- is provided with  $N$  pieces of information and granted the authority to decide whether the policy is adopted. The expected utility from the policy is thus  $W(N,1)$ .<sup>7</sup> And since the decision-maker is just one individual

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<sup>7</sup> This neglects the fact that if the decision-maker is elected, he or she also knows what fraction of the population has an average signal that is positive. This complication turns out to be unimportant.

out of a continuum, the costs of the information to him or her,  $C(N)$ , have a negligible impact on average social welfare. Social welfare is therefore maximized by making  $N$  arbitrarily large, which means that the decision-maker knows  $U$  with certainty. The expected benefit from the policy therefore reaches  $W^*$ , the maximum possible value. (In practice, of course, there are limits to individuals' ability to absorb information and costs to delaying decisions; thus the amount of information actually provided to representatives is not unlimited.)

A system of this type is unambiguously preferable to dictatorship. Under a dictatorship, just as under a referendum, there are positive externalities to information acquisition. Forcing the sole decision-maker to have the welfare-maximizing value of  $N$  therefore produces higher welfare than letting him or her choose  $N$ .

Whether a system of this type is necessarily preferable to a referendum system, on the other hand, depends on the nature of the direct utility from political participation. If it is the act of participating that provides direct utility, then a system of ex post education, with  $N$  arbitrarily large, is the global optimum: individuals choose  $N$  so that  $B(N) - C(N)$  is at its highest possible level, and the elected representative's amount of information is chosen so that the expected benefits of the policy are at their highest possible level. But in this system, voters' actions have no impact on the decision of whether to adopt the policy: the decision is determined by the information the elected representative learns after his or her election, and is utterly unaffected by the outcome of the election. It is reasonable to suppose that individuals might get no utility from this type of political participation. In this case, expected social welfare is just  $W^*$ , which may be either more or less than expected utility under a referendum,  $[B(N^{\text{DEMO}}) - C(N^{\text{DEMO}})] + W(N^{\text{DEMO}}, \infty)$ .

When representatives switch their positions in response to new information,

they are switching to positions that the majority of voters oppose. Thus they may face conflicts between doing what the majority prefer and doing what they believe is best for society. In such situations, institutions that lower the benefits of pleasing voters may improve political outcomes. Two examples of such mechanisms are term limits (so that reelection is not a possibility) and long terms of office (so that reelection, or running for another office, is less important).

## V. THE DETERMINATION OF POLITICAL INSTITUTIONS

It is natural to suppose that if a set of institutions gives rise to inefficient decisions, society will adopt different institutions. A system in which representatives are educated after they are elected, or information provision is subsidized, tends to produce good decisions even in the presence of misconceptions. Thus it appears that if misconceptions are an important possible source of poor political decisions, society would adopt one of these systems.

There are two problems with this argument. First, overcoming misconceptions is not the only problem that must be solved in designing political institutions. A system must also function well in the face of distributional conflicts among voters, politicians who have objectives other than maximizing social welfare, and other complications. No system can solve all these problems completely, and we do not know what system is best in the face of all of them together. Thus until we have a complete description of all the problems and of the best way of addressing them together, there is value to a partial-equilibrium approach that takes institutions as given and asks how successful they are in solving the problems individually.

Second, and more important, just as voters' incentives to gather information and evaluate competing policy proposals are small, so too are their incentives to evaluate alternative institutions. The chances that any single individual's actions will change society's institutions are small. As a result, individuals have only small incentives to determine what problems institutional arrangements should solve, or what arrangements best solve those problems. They are therefore likely to have highly imperfect assessments of the desirability of various institutions, and their errors in those assessments may have a common component.

This observation implies that institutions are of independent importance to political outcomes. We cannot assume, even in situations where public policies affect everyone identically, that institutions are chosen to combine individuals' heterogeneous information optimally. Rather, the institutions that evolve may reflect individuals' superficial impressions of what arrangements are desirable.

In addition, the observation that individuals' incentives to evaluate institutions are small implies that there can be multiple equilibria in institutions. This is easiest to see in a natural baseline case. Suppose that all participants in the political process (voters, elected leaders, dictators, and so on) evaluate institutions solely according to the outcomes they produce; that they know what outcomes will be produced under different institutions; and that decisions concerning institutional change must be made according to the current institutions, in the same way that the decision of whether to adopt a proposed policy is made. It is clear that under these assumptions, there can be no substantive institutional reform. Any proposal to adopt institutions that would lead to the adoption of different policies than would be adopted under the current system will meet the same fate as proposals to adopt those policies directly. Thus any institutions, once in place, will remain.

The result that there can be multiple equilibria in institutions strengthens the case that institutions are of independent importance. If different institutional arrangements are possible and if different arrangements lead to different political decisions, then institutions are clearly not just a passive reflection of the public's preferences.

The assumptions that political actors know what outcomes will be reached under different institutions and evaluate institutions only according to the outcomes they will produce are clearly too strong. Even if these assumptions do not hold exactly, however, there is still a force acting to create multiple equilibria: if a set of institutions leads to the defeat of a proposed policy, it is also likely to lead to the defeat of a proposal to adopt institutions under which the policy would be adopted. But when the assumptions do not hold exactly, there can be situations where it is possible to adopt a policy indirectly through institutional reform that cannot be adopted directly. For example, there may be an institutional arrangement that is superficially appealing even though the policies that would be adopted under it are not. In addition, since institutional arrangements affect decisions about many policies, individuals' incentives to evaluate them are larger. Thus it is possible for one-time institutional reform to lead to the adoption of a range of desirable policies even though each of the policies might be defeated under the old system.

## VI. CONCLUSION

Governments often adopt policies that at least appear inefficient. Examples include price controls, protection, and persistent budget deficits. In trying to

understand the sources of these policies, economists have devoted a great deal of attention to the possibility that strategic interactions among individuals who know the policies' effects but who have divergent interests or preferences can produce inefficient outcomes.

Yet the fact that political decisions so often have seemingly inefficient consequences suggests that we should not focus our search for explanations of such decisions narrowly. This paper identifies another reason that inefficient policies may be adopted: it may be that the policies are inefficient, but that enough of the participants in the political process have incorrect beliefs about the policies' likely effects that they are adopted anyway. This paper develops a simple model that illustrates this possibility, and investigates how such correlated errors in belief affect political decisions under different institutions.

The view that seemingly inefficient political outcomes arise from misconceptions has very different implications from the view that they arise from strategic interactions of knowledgeable individuals. If misconceptions are important, then efforts to improve officials' and voters' understanding of how the economy functions can systematically change political outcomes. But if these outcomes arise only from strategic interactions, such efforts are irrelevant, since the participants in the process already know how the economy functions. Indeed, one piece of evidence that misconceptions are important to political decisions is that economists devote considerable effort not just to educating public officials, but to correcting what they perceive to be consistent errors in their views about such matters as the importance of incentives, the effects of price controls, and the efficacy of government regulation.

This paper has considered only a bare-bones model of misconceptions and their effects. There are therefore many directions in which the analysis can be extended.

Here I mention three.

First, I have considered only primitive assumptions about information: individuals choose how much information to acquire, and additional information on average improves individuals' estimates of the proposed policy's effects. But a central feature of politics is that supporters of each side of a given issue or election disseminate information intended to sway voters toward the position they support.

Analyzing such behavior would require extending the model of information. For example, one could investigate models where there are different types of information with different effects; where policies vary not only in their impacts on social welfare but in how quickly voters' estimates of those impacts converge to the truth as a function of the amount of information they have; where voters differ not just in the amount of information they have, but in their ability to absorb new information; and so on. With such extensions, it would be possible to investigate various additional issues. For example, one could examine the possibility that there are policies whose social value is low but for which a superficially appealing case can be made relatively easily. In such a situation, the accuracy of voters' assessments need not be a monotonic function of the amount of information they receive, and so allowing some information dissemination can worsen the outcome. In addition, with more sophisticated models of information, one could extend the analysis to consider such issues as campaign spending, contribution limits, disclosure requirements, and regulations on the form or content of political advertising.

Second, I have abandoned the usual assumption in economic models of politics that officeholders may obtain direct utility from their positions or adopt policies that further their own interests at the expense of social welfare. But there may be important insights to be gained from asking how these possibilities interact with the

possibility of misconceptions. For example, the knowledge that individuals may be motivated by self-interest may be an important reason for voters' reluctance to defer to self-proclaimed experts. More importantly, there may be a tradeoff in designing political institutions between addressing the harms caused by leaders pursuing their self-interest and addressing the harms caused by misconceptions. For example, in deciding how much discretion to grant to leaders, there is likely to be a tradeoff between allowing them to act on the basis of new information they obtain about how to further social welfare and allowing them to pursue their own interests at the expense of social welfare.

Finally, there may be patterns to misconceptions. That is, errors in assessing the benefits of alternative policies are likely to be correlated not just across individuals, but across policies. In physics, individuals' errors appear to stem not from the details of each particular problem, but from loosely held views of how the physical world operates that are incorrect in systematic ways. As a result, it is often possible to predict the errors individuals will make when confronted with new questions (see, for example, Halloun and Hestenes, 1985, Hestenes, Wells, and Swackhamer, 1992, and Cohen, Eylon, and Ganiel, 1983).

The same may be true with regard to public policy issues. For example, there may be a general tendency to neglect policies' long-term consequences, or to underweight their general-equilibrium effects relative to their direct effects, or to overemphasize their ability to deal with a problem that has arisen recently relative to other likely problems.

If one could say more about the likely nature of misconceptions in evaluating public policies, it would be possible to further extend this paper's analysis. For example, it would be possible to go beyond the general observation that

misconceptions can cause the political process to produce inefficient outcomes to specific predictions about the kinds of inefficiencies that are likely to arise.<sup>8</sup>

Similarly, it would be possible to evaluate the consequences of various institutional arrangements that the framework of this paper cannot be used to analyze. Possible examples include arrangements that prevent certain types of policies from being adopted quickly and ones that allow policymakers to pursue new policies for an extended period before being subject to electoral review.

More generally, the research program suggested by this paper is that of bringing ideology back into the analysis of politics. In most economic analyses of politics, voters' and politicians' ideologies -- that is, their beliefs about the functioning of the economy, the political system, and so on -- are irrelevant to political outcomes. Individuals are endowed with perfect knowledge of these matters, or at least have independent errors. They then maximize their utilities given these beliefs and the constraints they face. To take an extreme example, Shleifer and Vishny (1992) propose an explanation of the role of prices in allocating resources under communism based purely on government officials' self-interest, on the assumption that the officials' understanding of the functioning of markets was no different from those of modern Western economists. Although their explanation is plausibly part of the story, it seems unlikely that Marxist beliefs about something as fundamental as markets were irrelevant. Ideological debate and rhetoric are prominent features of politics. There may be a great deal to be learned if we do not presume that such rhetoric is just a mask for individuals' well-informed pursuit of their self-interest, but instead consider

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<sup>8</sup> Various authors attribute specific policy outcomes to misconceptions. For example, Buchanan and Wagner (1977) argue that budget deficits arise from misunderstandings of deficits' effects, and Romer and Romer (1997) argue that misunderstandings of the effects of monetary policy are an important source of inflation.

the possibility that it often reflects individuals' true beliefs and that these beliefs often influence their actions.

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