The information-aggregation approach to political institutions

Thomas Piketty*

CEPREMAP, 142 rue du Chevaleret, 75013 Paris, France

Abstract

This paper offers a short survey of recent contributions about the information-aggregation role of political institutions. We argue that these recent developments represent a promising come-back to the Condorcet's original approach to political economy and allow to renew the efficiency analysis of alternative political institutions. In the same way as in the economic literature on the price system and the informational rationale for non-market insitutions such as firms, this recent literature that the basic efficiency of majority-rule voting and other electoral systems needs to be complemented by non-voting political institutions such as political parties, public debate and polls. © 1999 Published by Elsevier Science B.V. All rights reserved.

1. Introduction

During the past 10 years, a growing number of papers have been using the tools and concepts of information economics in formal political models. In a sense, formal political theory is now going through the same 'informational revolution' as economic theory during the 1970s and 1980s. This paper aims to

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* E-mail: thomas.piketty@cepremap.cnrs.fr.

offer a brief survey of these recent developments and to evaluate the potential of this 'information-aggregation approach' to political institutions.

The basic premise of this approach is the same as that of modern economics: information pertinent to individual decisions never exists in concentrated or integrated form, but solely as the dispersed bits of incomplete and frequently contradictory knowledge which all the separate individuals possess (Hayek, 1945, p. 519), and therefore the objective of political institutions (just as that of economic institutions) is to allow for an efficient use of these dispersed bits of information. In economics, the informational efficiency theorems obtained in the Arrow–Debreu model can be viewed as the founding result of this approach: the price system delivers Pareto-efficient allocations, i.e. even a planner with full information on all individual preferences and production technologies could not re-allocate resources so that everybody is better off than in the decentralized market equilibrium. Since then, the general objective of theoretical economic research has been to explore the limits of this basic efficiency result, and in particular how other non-market insitutions, such as firms, contracts, government regulators, etc., use available information in order to complement the market mechanism.

Economists have however always been more reluctant to apply this approach to the study of politics. In the traditional public choice approach, politics is viewed merely as a game where selfish rational actors seek to divide the pie produced by economics.[1] This basic approach implies that there is not much of a productive role for political institutions: since all what politics is doing is to divide a pie, alternative political insitutions (such as dictatorship, majority-rule voting or various electoral systems) simply correspond to different allocations of power and alternative divisions of the pie. In addition, democratic political markets are frequently viewed by economists as being inefficient because of monopoly, rent-seeking and poorly informed voters (with no private incentive to become informed), so that politics not only does not produce any positive value but frequently destroys some of the positive value produced by economics.[2]

Although this approach has been largely dominant in modern formal political models, this has not always been so. In particular, the formal framework developed by Condorcet (1785) is based explicitly on the idea that political institutions have a constructive role to play in order to allow for an efficient aggregation of all the socially-useful information that is dispersed among

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[1] See Downs (1957) and Buchanan and Tullock (1962) for classic references in the early public choice literature.

[2] See however Wittman (1989) for a Chicago, Coase-type view of why democratic political markets are necessarily efficient (the efficiency of 'laissez-faire' is stated forcefully, but with little attempt to analyze rigorously which exact institutions allow for such an efficient use of dispersed information; this approach ressembles that of Hayek with respect to the efficiency of economic markets).

individuals. Condorcet's basic result, the so-called 'Condorcet Jury Theorem', states under which conditions majority-rule voting yields efficient information aggregation. But Condorcet also examines what information structures imply the informational efficiency of other electoral systems (indirect democracy, multi-stage voting, etc. . . .). In a sense, the recent literature surveyed in this paper represents a come-back to the original Condorcet approach. This paper seeks to briefly summarize the main results of this recent literature and to argue that this come-back represents a fruitful opportunity to renew the efficiency analysis of alternative political insitutions.

The rest of this paper is organized as follows. Section 2 focuses on information aggregation through voting institutions (Section 2.1 recalls the basic logic of the Condorcet Jury Theorem, while Section 2.2 describes recent extensions of this result). Section 3 covers a number of recent papers showing how non-voting political institutions can complement electoral systems in order to achieve more efficient information aggregation. This includes the role for political parties (Section 3.1), political action and public debate (Section 3.2) and vote-trading (Section 3.3). Section 4 concludes.

2. Information aggregation through voting

2.1. The Condorcet Jury Theorem

In its simplest form, the Condorcet Jury Theorem simply states the following. Assume that a population of size n has to choose between two possible policies $P = A$ or B, and that all agents have the same state-dependant utility function $U(P/s)$: if the state of the world s is equal to s_A, they all prefer policy A to policy B ($U_A(A/s_A) > U(B/s_A)$), and conversely if $s = s_B$ ($U(B/s_B) > U(A/s_B)$). Further assume that all agents have the same initial prior beliefs about the state of the world $\mu_0(s_A) = \mu_0(s_B) = 1/2$, and that they all receive a signal $\sigma = \sigma_A$ or σ_B drawn from the same conditional distribution, such that $\text{Prob}(\sigma = \sigma_A/s = s_A) = \text{Prob}(\sigma = \sigma_B/s = s_B) = p > 1/2$. Then the Condorcet Jury Theorem simply states that if free elections are held, then the probability that the efficient policy (A in state s_A, B in state s_B) wins a majority of the vote tends to 1 as n goes to $+\infty$. In other words, majority-rule voting allows efficient information aggregation, and nobody would prefer to be a dictator.

This result is a trivial consequence of the law of large numbers, but it is powerful. It expresses in a formal way the common-sensical view according to which democracy is a good system to the extent that one is ready to assume that 'more than half of the people are right more than half of the time'. It shows in a very transparent way why 'political institutions matter': unlike in the public choice, 'divide-the-pie' view of politics, where everybody would prefer to be the

dictator and democracy is in no sense more efficient than dictatorship, the Condorcet Jury Theorem shows that not all political insitutions are alike from an efficiency viewpoint. This informational efficiency result about majority-rule voting should be given the same status in political theory as the Arrow–Debreu efficiency result about the price system in economic theory: it provides us with the most basic (and most fundamental) rationale for the most basic political institution. Moreover, in the same way as the Arrow–Debreu model, the Condorcet Jury Theorem provides us with a modelling framework that can be easily extended in order to analyze the limits of the basic efficiency result. For instance, in his 1785 book, Condorcet also considers more general cases where all agents do not receive the same signal quality, which allows him to look at indirect democracy, multiple-stage voting, etc. For instance, if only a subset of the population is well-informed about policy alternatives but the rest of the population is well-informed about who is well-informed about policy alternatives, then indirect democracy is optimal (the entire electorate elects a parliament with well-informed individuals, who then take the decision). Condorcet then develops some simple calibration exercise using hypothetical data about 18th century France (how many millions of people have what probability of receiving the right signal, etc.), and states his conclusions about the optimal consitution! All the theoretical results and calibration exercises proposed by Condorcet are pretty straightforward, but they exemplify in a very transparent way the type of mapping from fundamentals (information structures) to optimal institutions that would become two hundred years later the core methodology of modern economic modelling.

These results have however been largely neglected by the early public choice literature, and Condorcet majority cycles have become much more widely-known than the Condorcet Jury Theorem, in spite of the fact that the former played a rather secondary role in Condorcet's general approach.[3] This neglect is probably due to the fact that the very idea of a common optimal policy about which different voters would just have different opinions and signals did sound very suspicious to early public-choice theorists. The latter thought that politics should be described as a pure conflict between rational selfish interests, and Condorcet's idea of a common optimal policy reminded them of the totalitarian excesses of the French Revolution. This neglect is largely mistaken, however. As recent extensions of the Condorcet results have shown, the information-aggregation approach to political institutions can still be useful even if one takes the (reasonable) view that politics involves not only a constructive conflict between opinions and signals but also a conflict between individual interests and 'preferences' that cannot be reduced to its informational dimension.

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[3] See Young (1988) for an enlightening clarification of the link between majority cycles and the Jury Theorem in Condorcet's works. See also Young (1995).

2.2. Extensions of the Condorcet Jury Theorem

Condorcet did not take into account the possibility of strategic voting, i.e. he implicitly assumed that voters would just vote 'sincerely' for policy A if they receive signal σ_A and for policy B if they receive signal σ_B. Austen-Smith and Banks (1995), Feddersen and Pesendorfer (1994, 1996, 1997) and Myerson (1994) have shown that taking into account the possibility of strategic voting does actually allow to generalize and reinforce Condorcet's intuition about the informational efficiency of voting institutions. First, strategic voting implies that the Condorcet Jury Theorem still holds in the case of asymmetric signals. For instance, in case $\text{Prob}(\sigma = \sigma_A/s = s_A) > \text{Prob}(\sigma = \sigma_A/s = s_B) > 1/2$, i.e. if signal σ_A is always more likely than signal σ_B (including in state s_B), then sincere voting would always lead to the victory of policy A (with large enough electorates), which would be inefficient. But the point is that this is not an equilibrium: if I receive signal σ_A and I expect everybody to vote sincerely, then I expect to be the decisive pivotal voter with a much larger probability in state s_B than in state s_A (since the predicted election margin is smaller in state s_B), which implies that, conditionally on being decisive, I actually prefer to vote for B, i.e. not to vote 'sincerely'. The informativeness of being pivotal implies that in equilibrium, σ_A-voters vote with a positive probability for policy B, so that the expected election margin is symmetric in both states, the fact of being pivotal is no longer informative and the efficient policy wins the election with probability 1 with large enough electorates.[4] This same logic also applies to the case of unequal signals: voters with low-quality signals will rationally choose to abstain, so as not to interfere with the efficient aggregation of information performed by voters with higher-quality signals. For instance, in the extreme case where it is common knowledge that one voter receives a signal of perfect quality and all other voters receive signals of inferior quality, then nobody wants to counterbalance the vote of the perfectly informed voter, everybody (except the perfectly informed voter) rationally chooses to abstain, so that in equilibrium all information is used efficiently. This simple intuition about 'rational abstention' can be extended to more general informational settings and to electorates with heterogeneous policy preferences.[5]

All these extensions focus on the two-candidate case initially considered by Condorcet. With three or more candidates, the issues of information aggregation and strategic voting are more complex. Piketty (1995) shows that in order to communicate their information and to influence future elections, voters can rationally choose to vote for loosers in three-candidate elections (i.e. for third candidates with no chance of winning the election), which could not happen in

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[4] Myerson (1994) shows that this result holds for any asymmetric distribution of signals.

[5] See especially the series of paper by Feddersen and Pesendorfer (1994, 1996, 1997).

a static setting with no future elections.[6] In equilibrium, rational voters trade off their probability of being pivotal for the current election (by voting for their second-best choice) with their probability of being pivotal for future elections by giving an informative score to their most-preferred third-candidate, so that their propensity to vote for third candidates is an increasing function of the predicted electoral margin between the top two contenders (a prediction which is in line with empirical observation). The fact that rational voters make trade-offs between such objectives when they decide how to vote has important consequences for the design of an electoral system. The general implication is that since voting is used as a communication device, electoral systems should be designed accordingly, i.e. so as to facilitate efficient communication and information aggregation. For instance, two-round electoral systems (with a runoff between the top 2 candidates of the first round) are typically more efficient than one-round majority-rule systems, because they allow for a better separation between the communicative role and the current decision-making role of voting. This kind of result exemplifies the usefulness of the information aggregation approach to political institutions: this approach allows formal theorists to make meaningful efficiency comparisons of existing electoral systems, while the traditional public-choice approach did not.

3. Information aggregation through other political institutions

3.1. Political parties

One key lesson of modern ecoomic theory is that the price system needs to be complemented by non-market institutions, and in particular by firms, in order to achieve efficient information aggregation. The same is true for political insitutions: electoral systems need to be complemented by non-voting institutions, and in particular by political parties, in order to achieve efficient information aggregation. One informational rationale for political parties has recently been proposed by Caillaud and Tirole (1997a): since the informational efficiency of voting works better with more homogeneous electorates, it is useful to have intra-party information aggregation (parties are presumably more homogeneous) prior to information aggregation through voting.[7] In the same way as for

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[6] Voting for loosers can also occur for the same reasons in two-candidate elections: for instance, if I know that A is going to win anyway, I might vote for B in order to obtain a closer margin of victory and to express the fact that there exists an intermediate policy between A and B that I would like to be implemented in the future. On this type of behavior, see also Castaneiha (1998).

[7] On the limits to efficient information transmission within heterogeneous groups, see also Banerjee and Somanathan (1997). Spector (1996) argues that even if they are equally heterogeneous, small groups (such as parties, parliaments, …) allow for more sophisticated information transmission than larger groups, because the fact that the probability of influencing equilibrium beliefs and collective decisions is larger in smaller groups makes incentive-compatibility constraints easier to satisfy.

the study of the firm, the natural next stage is to enter into the 'black box' of political parties, in order to determine what rules and institutions better allow parties to complement voting institutions. This promising avenue for future research has first been explored by Caillaud and Tirole (1997b), who analyze which intra-party organization (hierarchical, democratic, . . .) better allow parties to make up voters' informational deficit.[8,9]

3.2. Political action and public debate

'Formal' political insitutions such as electoral systems and political parties can also be complemented by informal institutions. For instance, Lohmann (1994a, 1994b, 1997, 1998) has analyzed how 'political action' (street demonstrations, pressure groups, ..) can be used in order to transmit more information into the political process than by using voting alone.[10] Direct communication through public debate can also be necessary in order to enable voting to perform efficient information aggregation. Spector and Piketty (1995) have shown under what conditions will rational debate lead to one-dimensional conflict. The intuition is that as long as disagreements are multi-dimensional, one can always find incentive-compatible directions of communication, until the point where disagreements become one-dimensional and only voting can aggregate the residual information.[11] Communication can also take place via opinion polls: McKelvey and Ordeshook (1985), Cukierman (1991) and Fey (1995) have shown how pre-election opinion polls can be necessary in order to achieve efficient information aggregation at the time of voting.

3.3. Vote-trading

According to the traditional public choice approach, the opportunity to trade voting rights on a 'market for votes' is always efficiency-enhancing. For instance, if the majority prefers A to B with a very small utility differential while the minority prefers B to A with a very large utility differential, then everybody would be better off if the minority could buy off the votes of the majority (see,

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[8] See also Cukierman and Tommasi (1995), Dewatripont and Tirole (1995), Persson et al. (1996) and Schultz (1994) for recent analysis of the costs and benefits of having polarized parties or conflicting powers (like, e.g., the executive and the legislative) in order to generate information transmission to the electorate.

[9] See also Gilligan and Krehbiel (1990) and Krehbiel (1991) on the interplay between legislative organization and the efficiency of information trasmission, and Green (1993), who analyzes the rise of parliamentary insitutions in terms of informational efficiency.

[10] See also Ladha (1992) on the virtues of free speech in a simple model of the Condorcet Jury Theorem.

[11] See also Austen-Smith (1992) on the role of cheap talk in political processes.

e.g., Buchanan and Tullock 1962). However, if voting is used to aggregate information, then vote-trading can actually make things worst, as individual voters might not internalize the informational value that their vote has for other voters. For instance, even if there is a small fraction a of certain voters (who do not care about the state of the world) and a large fraction $1 - a$ of uncertain voters (whose most-preferred policy depends on their signal σ_A or σ_B), then if the latter are sufficientely uncertain (p sufficiently close to 1/2), they will sell all their votes to certain voters, so that all information is lost and the equilibrium policy does not depend on the state of the world (see Piketty, 1994). This result exemplifies the difference between the traditional public choice approach and the information-aggregation approach: according to the latter, voters have something to exchange through voting, and traditional exchanges on economic markets might actually interfere with this socially useful process.

4. Concluding comments

The information-aggregation approach to political institutions does not only allow to renew the theoretical efficiency analysis of alternative political institutions. It also offers new perspectives for empirical work. For instance, there exists a huge body of data on voting behavior in various electoral systems, but traditional models do not allow us to analyze properly the efficiency implications of real-world phenomena such as voting for third candidates, multiple-stage electoral systems, etc. Lupia (1994) and Lupia and McCubbins (1998) have shown that properly designed survey research can also allow us to measure how voters actually deal with information transmission, by using 'informational shortcuts', with the help of various institutions, etc.[12]

As Lupia and McCubbins (1998) put it, 'debate about democracy has always been a debate as to whether the pervasiveness of ignorance is going to lead to massive manipulation; we argue that the complexity of the world and the bounded rationality of the agents is actually matched by the huge ability to adapt of human beings and adequate democratic institutions'.

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[12] See also Rahn (1993).

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