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Random errors, dirty information, and politics

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Abstract. Rational voters' assessments of candidates and policy proposals are unbiased, but affected by random errors. "Clean" information decreases these errors, while "dirty" information increases them. In politics, most voting procedures weigh random individual errors asymmetrically. Thus, such errors do not counterbalance one another in the aggregate. They systematically affect politics. This illuminates the roles of political propaganda and interest groups. It helps to explain various puzzles in Public Choice, e.g., the frequent use of inefficient policy instruments. Institutional conditions are identified that shape the aggregate impact of individual errors and the politicians' incentives to produce dirty information.

1. Introduction

In Political Economy, all actors are assumed to behave rationally, i.e. not to commit systematic errors. Nevertheless, it is often presumed that voters can be systematically influenced by political propaganda. We believe this to be inconsistent: Rational individuals know that propaganda is targeted at them and react accordingly. On the other hand, we agree that political decisions can be affected by political information. Thus, this article searches for the logic behind information's political power. It will be argued that rational individuals are capable to unbiasedly assess policy proposals and the positions and platforms of politicians and parties. Their estimates, however, are affected by random errors. The size of such errors depends on the information available. Information in the traditional sense improves the individuals' knowledge and decreases estimation errors. Such information can be characterized as "*clean information*". "*Dirty information*", on the other hand, enlarges the individuals' estimation errors. Individual errors, although being unsystematic and randomly distributed, have systematic effects at the aggregate level. They do not necessarily counterbalance one another, as they are weighted asymmetrically in most political decision-making processes. Therefore, political

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propaganda, which is ineffective towards the average political opinion but alters the size of the individual estimation errors, may change individual voting behavior and thus aggregate political outcomes. This creates incentives for various actors to produce dirty and clean information.

The paper proceeds as follows: the second section presents the basic elements of the random errors and dirty information concept, and contrasts it to other approaches to political information. The third section focuses on the explanatory power of our concept. Various "puzzles" of Political Economy (e.g., the incumbency effect or the intensive use of allocatively inefficient policy instruments), so far explained with many differing theoretical approaches, can easily be inferred. The strategic use of dirty information is discussed in the fourth section. The effect of dirty information on political outcomes depends on various identifiable institutional conditions. This aspect is dealt with in the fifth section. The last section offers some concluding remarks.

2. Dirty information and random errors

a. Basic elements

In our approach, three aspects are emphasized:

(1) For individuals, it is costly to process information (see Simon, 1957; Conlisk, 1988). They optimize by equalizing information's marginal benefits and costs. Thus, individuals are never fully informed (Stigler, 1961). Their estimates are not perfect but affected by random errors. The estimates are, however, unbiased, as systematic errors provide cheap information from which individuals can learn (see also Gerber and Lupia, 1993; Alvarez and Franklin, 1993). The random errors are larger, the higher the information processing costs are.

(2) In contrast to traditional economics of information (see Hirshleifer and Riley, 1979; Stiglitz, 1984 or Sappington and Stiglitz, 1987), our approach knows no unequivocal relationship between the amount of information available and the quality of individual's decisions. Of course, an inflow of information (e.g., through political propaganda) increases the amount of information available. However, it is costly for individuals to assess the new information's quality. "Dirty information", which is irrelevant or even wrong, increases information costs by diluting the relevant information.[1] The more "dirty information" is available, the higher is the cost to isolate "clean information" and the larger are the individual estimation errors.

(3) Individuals' random estimation errors are not irrelevant at the social level, as they are weighted asymmetrically in most political aggregation procedures. This will be exploited by various political actors who increase and

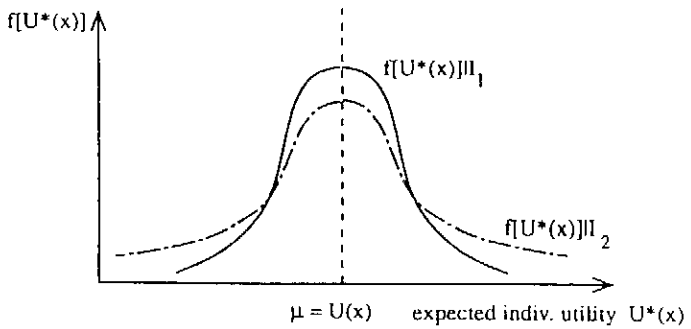

Figure 1. Estimation errors and information.

decrease these errors by targeting dirty and clean information at individuals. However, the individual's estimation errors keep being randomly distributed, as rational individuals will react to dirty information and political propaganda. They know that political information is purposely manipulated and try to de-bias it.[2] De-biasing will not be perfect either, as individuals cannot grasp the extent of the bias perfectly.[3] Some of them will overestimate, others will underestimate the bias. The resulting de-biased expectations are randomly distributed around the "true" value. As the errors without dirty information and the error variance of the de-biasing process are to be added, dirty information increases errors, i.e. it leads to a mean preserving spread (Rothschild and Stiglitz, 1970) of individual expectations. This is illustrated in Figure 1.

The horizontal axis represents the individual estimate of utility U^* resulting from a certain policy measure x. The vertical axis represents the density function of the individual utility estimation $f[U^*(x)]$, given information I.[4] As all estimates are unbiased, the expectation value $\mu = E[U^*(x)]|I$ always equals the "true" utility, i.e. $\mu = U(x)$. Figure 1 shows two representative density functions for two different amounts of information (I_1, I_2). By assumption, I_1 and I_2 consist of the same amounts of clean information, but I_2 includes more dirty information than I_1. Thus the variance s_1 of $f[U^*(x)]|I_1$ is smaller than s_2.

Differences in the variances of the utility estimations may come about for two reasons:

(i) Differences in information: The political actors' incentives to produce dirty and clean information determine the amount of dirty and clean information available.

(ii) Complexity of policy issues and individual human capital: The individuals' estimation errors are larger, the more complex an issue is. However,

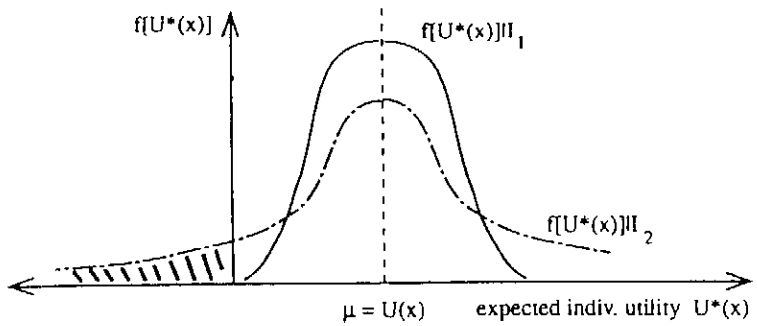

Figure 2. Strategic dirty information.

it is difficult to measure the complexity of an issue independently from the individuals' human capital.

b. The effect of dirty information

For many economic problems, individual random errors seem rather irrelevant. In market-settings, they often cancel out each other (see Becker, 1976: ch. 5). In the political process, however, they have systematic effects, as "positive" and "negative" errors do not necessarily counterbalance each other. This can easily be seen by looking at a simple majority vote. Voters who overestimate the benefits of an issue they profit from vote "yes", as they would do if they knew the true benefits. They have only one vote and cannot express their strong preferences. In contrast, voters who underestimate the benefits to the extent that they assess the issue negatively, express their biased preferences by voting "no". Thus, the asymmetry and the incentives to produce dirty information stem from the fact that in most political decision procedures, the preference intensity cannot be fully expressed. This is shown by Figure 2, where the horizontal axis shows the individually expected utility from a policy x compared to the status quo. The density functions differ with respect to the amount of dirty information available. With little dirty information ($f[U^*(x)]|I_1$) the individual certainly votes in favor of x. However, with increasing amounts of dirty information, the density function becomes flatter ($f[U^*(x)]|I_2$) and the individual votes with a certain probability against x. This is represented by the hatched area. The possibility to turn around some voters creates incentives for political actors to strategically produce dirty information by manipulating information (e.g., by withholding and biasing relevant information, by spreading plain lies or by advocating inconsistent positions), and by complicating issues intendedly in order to increase errors.

c. "Traditional" concepts of information manipulation

Some aspects of random errors have been discussed in the literature on "probabilistic voting" (see Coughlin, 1986; Lafay, 1993). According to Austen-Smith (1987), a risk averse voter evaluates candidates and parties taking into account his subjective uncertainty on their respective positions. Candidates can decrease voter uncertainty by increasing campaigning expenditures. This is criticized by Hinich and Munger (1989: 51): "The role of campaign contributions/expenditures is to reduce the variance of voters' perceptions of candidate positions. Austen-Smith does not fully develop this insight, because he restricts the focus of each candidate's expenditures to reducing his own variance". Thus, in Hinich and Munger's model candidates can also increase the variance of their opponents. Again with the assumption of risk aversion, this model reproduces the incumbency effect and offers some insights on regulations regarding campaigning expenditures. Obviously, our approach has some similarities to "probabilistic voting". However, in contrast to probabilistic voting, our approach focuses on the factors determining the size of the individual random errors. Moreover, it is not restricted to risk aversion. Thus, candidates cannot only decrease their own and increase their opponents variance, but face a much broader set of strategies.

In the mainstream politico-economic literature, non-rational behavior of voters is often implicitly assumed, though rationality explicitly acknowledged (see Austen-Smith, 1991). Producing false or one-sided information, concealing important facts, or complicating political measures systematically impacts on how individuals assess political issues. Such systematic effects of information play a large role in the literature on, e.g., fiscal illusion (Buchanan and Wagner, 1977), the influence of interest groups (Becker, 1983; Ursprung, 1991), protectionism (Magee, Brock and Young, 1989), or inefficient transfers (McCubbins and Sullivan, 1984). Even in contributions explicitly focusing on information's political role, random errors are not accounted for and information is assumed to shift the density functions of individual estimates (recent examples are Dellas and Koubi, 1994; Ursprung, 1994).

Nevertheless, some illustrative evidence for the importance of random errors can be adduced. For instance, Pommerehne and Schneider (1978) find that the variance of tax payers' estimates of their tax burden increase with the complexity of the tax system, but that tax payers estimate their tax burden more or less unbiasedly, independently of the tax system's complexity. Oates' (1988) survey and Sorensen's (1992) work on fiscal illusion point in a similar direction; they find no systematic fiscal illusions. These results are in some way consistent with the economic approach to information and advertising (see Stigler, 1961; Wärneryd, 1986), where advertising is not taken to systematically manipulate voters. For the (Danish) political realm, this is cor-

roborated by Nannestad and Paldam (1991) who find that election propaganda has an astonishingly small systematic impact on voters' assessments.

The "traditional" approach to political information and the concept proposed here are not mutually exclusive. The opposite holds true: the approaches can be supplementary. They focus on different aspects which can both be relevant in reality. We do not intend to prove that individual estimates cannot be systematically influenced. We only maintain that systematic errors are inconsistent with rational expectations and try to work out the implications of random errors which are compatible with rational behavior and expectations. That both approaches can fruitfully coexist is illustrated by the literature on behavioral anomalies. Even though people often act anomalously (see, e.g., Kahneman and Tversky, 1984), they rationally strive against their anomalies. With increasing experience and incentives, they reduce and sometimes even eliminate anomalies (see Eichenberger, 1992; Frey and Eichenberger, 1994).

3. The explanatory power

In Political Economy various puzzles exist, which are explained with separate theoretical approaches. To mention only some of them: Income is often transferred in seemingly inefficient ways; externalities are but rarely internalized by applying the most efficient instruments, i.e. taxes and tradable permits; the incumbents seem to have a systematic advantage in elections; parties and politicians often take ambiguous positions in the election contest. All these "puzzles" can be easily inferred by the random errors' concept, as will be discussed in the following.

a. Inefficient policies

(i) Implicit vs. explicit income transfers

In economics, regulations and protectionism are often interpreted as redistribution policy which in some respects is inefficient (Tullock, 1989, 1990). The same amount of redistribution could be achieved by direct explicit transfers without biasing allocation. To explain this apparent inefficiency, it is argued that voters systematically underestimate the cost of implicit, indirect transfers as these are comparatively complex (see, e.g., Magee, Brock and Young, 1989: 257f.).

However, this puzzle can also be explained by random errors without assuming systematic errors, as the following example on agricultural policy illustrates. According to interest group theory (Olson, 1965), the farmers – a comparatively small and homogeneous group – are well organized and try

to obtain income transfers from the less organized majority, the consumers. Two policy instruments are at hand. With explicit, direct income transfers, all consumers pay an equal amount, the sum of which is evenly redistributed to the farmers. With implicit, indirect transfers, farmers' rents are created by restraining agricultural imports. Obviously, for most people it is easier to assess the consequences of explicit transfers. Thus, only few (or no) consumers vote in favor of explicit transfers, and few farmers vote against them. It is therefore difficult to implement explicit transfers that burden a majority. Implicit, indirect transfers, on the other hand, have a better chance despite being allocatively costly. As it is more complex to assess the consequences of this type of transfers, the consumers' estimation errors are larger, and some consumers erroneously vote in favor of implicit transfers. It could be argued, that the same argument applies to the farmers as well. However, there are at least three important differences. As there is more at stake for the farmers (the rent per farmer created by the transfer is typically higher than the cost per consumer), (i) farmers have better incentives to be informed, and (ii) a random error of a given size is less likely to induce a farmer to a mistaken vote than a consumer. (iii) As already noted, farmers are better organized than consumers. Their interest group is anxious to reduce farmers' random errors, in order to make sure that no farmer's vote is lost. This argument gives a new rationale for interest group activities: interest groups influence political outcomes by supplying clean information to their members and by feeding their opponents with dirty information in order to induce mistaken votes. This aspect of "information targeting" will be discussed in Section 3.

(ii) Regulation vs pricing

According to standard economic theory, pricing is the most efficient environmental policy instrument. Nevertheless, environmental policy mostly consists of regulations, and pricing is rarely applied (see Hahn, 1989). In the economic literature, many explanations for this fact are proposed, none of which is overly convincing (Frey, 1992). We believe, however, that random errors can be fruitfully applied to this problem, as will be illustrated by a stylized example of urban road transport policy designed to restrain commuter traffic. Whether the transport policy is based on pricing P (e.g., road pricing, see Morrison, 1986) or relies on regulations R, it will make some people lose (e.g., commuters and people working in the car industry) and others win (e.g., the inhabitants of the city, and people who do not use a car).

The upper part of Figure 3 shows the distribution of the winners' utility estimates. As regulations are comparatively inefficient, the expected individual benefit with regulations is smaller than with pricing ($\mu_{R_W} < \mu_{P_W}$). With pricing, a winner's density function is assumed to be flatter (i.e. the variance

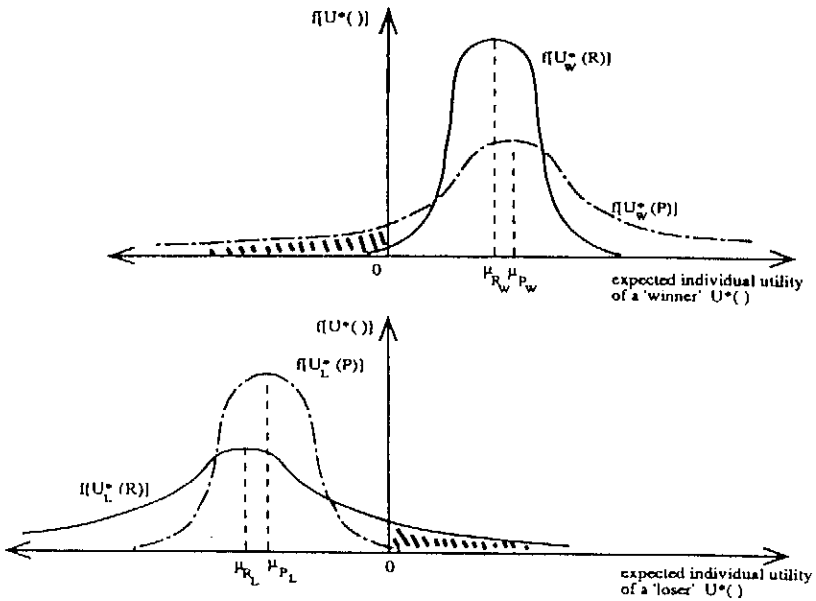

Figure 3. Pricing vs. regulation.

is higher, $s_{R_W} < s_{P_W}$), as (for non-economists) it is more difficult to assess the effects of pricing. In the example given in Figure 3, a winner certainly prefers regulations to the status quo, whereas he votes against pricing with a certain probability which is represented by the hatched area. Therefore, the winners' aggregate support for regulations is higher than for pricing, although they value the pricing instrument higher on average.

The lower part of Figure 3 represents the losers' individual estimates. Again, the expected utility of regulations is lower as they are less efficient $\mu_{R_L} < \mu_{P_L}$). However, the information costs crucially differ between losers and winners. With pricing, a loser's cost is simply the price he has to pay to use his car, whereas in the regulation case his costs are much more difficult to estimate; they depend, for instance, on the possibilities to evade the regulations. Thus, it is plausible that the estimation errors of losers are smaller in the case of pricing, i.e. $s_{P_L} < s_{R_L}$. Therefore, a loser votes in favor of the inefficient regulation policy (i.e. against the status quo) with a certain probability, whereas he certainly votes against pricing. In the aggregate, pricing gets less support by the winners from an active environmental policy and faces more opposition by the losers than the less efficient regulation policy. Consequently, it is less successful in the political arena.

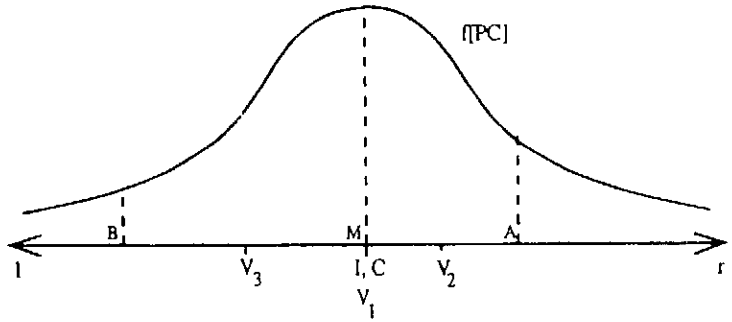

Figure 4. "Incumbency effect".

Obviously, the above discussion crucially hinges on the debatable assumptions made about the capabilities of losers and winners to understand the consequences of different policy measures. This, however, does not represent a drawback of the random error concept. Just the opposite is true: it merely points to the possibilities that exist in the political process to change aggregate outcomes by supplying dirty and clean information and by increasing voters' human capital. Thus, our concept might also elucidate the role economic advising plays in the political process.

So far the effect of random errors in direct democracies has been discussed. The next section applies the concept to representative democracies.

b. The "incumbency effect" and polarization

Incumbents seem to have a systematic advantage in elections (see, e.g., King, 1991; Reed and Schansberg, 1992). In the literature, many explanations are provided for the effect of incumbency.[5] King and Gelman (1991) hypothesize that incumbents are on average more productive than their challengers (by "learning on-the-job") and that they are able to supply better services because they enjoy some institutional advantages (see also Jewell and Breaux, 1989). Bernhardt and Ingberman (1985) build on probabilistic voting. They argue that voters assess political platforms based on their expectations and on the certainty of their expectations. As it is most often more difficult to assess the challengers, incumbents have a systematic advantage if voters are assumed to be risk averse.

Applying the concept of random errors, the incumbent's systematic advantage can be derived without the limiting assumption of voters' risk aversion.[6] Figure 4 illustrates the relevant case.

For simplicity it is assumed that the incumbent can be assessed with certainty and that the voters' preferences are equally distributed on the political spectrum.[7] The horizontal axis in Figure 4 represents the political spectrum

from "left" to "right", and the vertical again shows the distribution of representative individual estimates of the candidates' positions. In a simple two candidate model with vote maximization, the incumbent (I) and the challenger (C) take the position of the median voter (M) (see Downs, 1957). As we assume the voters to be rational and to have the same information, their expectations regarding the position of the challenger can be represented by the same density function $f(PC)$. Thus, in Figure 4, the median voter V_1 votes with certainty for the incumbent, as he assesses the incumbents position to be in the median with certainty, and the challenger's position to be in the median with an indefinitely small probability. Voters like V_2 and V_3 who stand anywhere on the right or on the left in the political spectrum, vote for the challenger with a probability smaller than 0.5. For example, voter V_2 who has slightly rightist political preferences, votes for the challenger only if he assumes the challenger's political position to be between M and A (nearer to his own political preferences than the incumbent). The density function $f(PC)$ reveals that this holds only with a probability of less than 50%. A similar argument applies for leftist voter V_3. He will vote for the challenger only if he assumes the challenger's position to be between B and M, which again holds only with a probability smaller than 50%. A closer inspection of Figure 4 reveals that a voter's probability to vote for the challenger is higher, the more extreme his political preferences are; however, the probability of a vote in favor of the challenger never exceeds 50%. Thus, in such a two candidate contest the incumbent always wins.

From a more general perspective, four cases can be distinguished:

(1) Both candidates take the same political position and both can be assessed by the voters to the same extent (i.e. $\mu_I = \mu_C$ and $s_I = s_C$): Both candidates get the same amount of votes and the winner is determined by chance.

(2) Both candidates take the same political position. The information cost for the voters, however, are different (i.e. $\mu_I = \mu_C$ and $s_I < s_C$): The candidate whose position can be estimated with smaller errors wins the election, as in the above example the incumbent does.

(3) The candidates have different political positions, but the information costs for the voters are the same (i.e. $\mu_I \neq \mu_C$ and $s_C = s_C$): The candidate whose position is nearer to the median wins.

(4) The candidates have different political positions, and the information costs for the voters are different (i.e. $\mu_I \neq \mu_C$ and $s_I < s_C$). If the candidate who can be assessed more easily takes a position closer to the median, he will win. In the reverse case, an unequivocal theoretical hypothesis cannot be advanced, as the two opposite effects tend to counterbalance one another.

The situation depicted in case (4) corresponds to political polarization. Such polarization endogenously emerges if the voters' information cost to assess the two candidates are different. Then, the two candidates will no longer take the same position – as in Downs' model. The candidate who can be assessed more easily (normally the incumbent) has a certain leeway to deviate from the median position without loosing the vote. The losses from not being in the median (where his competitor will stay) will be compensated to a certain extent by the fact that voters assess his position with smaller random errors. The extent to which an incumbent has an advantage over his or her competitors thus hinges on the relative size of the voters' random estimation errors, which obviously depend on institutional conditions. The longer challengers are in politics and the easier they can gain reputation in other political positions, the better they can be assessed. This is the case, for instance, in federalist countries where the various political positions at the different government levels provide the candidates with a wide range of opportunities to become well known and easily assessable.

4. Strategies

Political actors intentionally influence voters' random errors. This cannot only be done by employing the strategies already discussed, but in a great many other ways, some of which will be discussed in the following.

Targeted information, ambiguity and interest groups

Random errors provide new strategic opportunities to interest groups. The more cost-effective a group can identify and isolate its constituency, the more it will differentiate information activities according to audiences, i.e. the more it will produce targeted information. Clean information is given to the own members, and lobbyists will assist them in de-biasing dirty information of opposing interest groups. This reduces the members' estimation errors and thus votes lost. Members of opposing groups, on the other hand, are fed with dirty information to increase their estimation errors in order to induce mistaken votes. Obviously, information cannot be easily differentiated according to target audience, but there are at least two ways which seem promising: The first strategy aims at differentiating information prices. Politicians and interest groups provide clean information to their potential supporters privately, i.e. in closed meetings or by written information (so that it is difficult and expensive for potential opponents to obtain this clean information), and they may avoid (clean) public statements which are automatically heard by potential opponents. The second strategy aims at the type of information

given. Lobbyists will talk a lot about issues of concern to their potential supporters and little about issues of interest to their potential opponents; in this latter respect, they will take an ambiguous position (see also Shepsle, 1972 and Alesina and Cukierman, 1990 for alternative explanations of the often observed ambiguity of political platforms). This allows politicians to decrease uncertainty on political dimensions relevant to potential supporters while preserving uncertainty on dimensions relevant for potential opponents. Thus, the random errors of supporters are decreased while the errors of potential opponents are unaffected or even increased. This short discussion also sheds fresh light on the role of interest groups. An interest group is the more influential the higher its capacity to target information is, i.e. the better it can identify potential supporters and potential opponents and the better it can protect potential supporters against hostile dirty information.

Censorship

It is often argued that censored information is systematically biased and thus manipulates the citizens. However, rational individuals know the biasing effect of censorship. They either try to reconstruct the true content of censored information or simply do not believe the official versions. The dirty information concept takes such reactions into account and emphasizes additional aspects. Censorship serves the government by hindering the opposition to disperse dirty information, and it reduces the flow of clean information and tends to increase individual estimation errors.[8] If the government's potential supporters have access to better information opportunities than members of opposition groups (which will normally be the case), censorship has an asymmetric effect. It increases the potential opponents' estimation errors more strongly than the potential supporters' errors. Thus, it tends to increase government popularity.[9]

Systematic cycles

Voters' random errors may well cause a new type of cycling majorities. Consider the urban transport policy example from Section 3a (Figure 3) comparing the status quo in traffic policy (SQ, no interference with private traffic) with two new proposals, a simple but inefficient ban on private motorized traffic (R), and a highly efficient but complex "road pricing" system (P). As has been shown, it is possible for alternative SQ to beat P with simple majority (everybody related to the car industry prefers SQ, and some voters of the opposing group mistakenly favor SQ) and to lose against the less sophisticated proposal R. The observed asymmetry favoring less complicated proposals fosters traditional and well known solutions. However, up to now only votes between the status quo and the new alternative have been considered. When the new alternatives are compared, this asymmetry disappears.

Then, the different sizes of the random errors have no effect. Pricing policy P beats regulation R, because a majority of both groups votes for P. Thus, a specific cycle emerges: Road pricing policy P loses against the status quo SQ, but it beats the traditional regulation policy R which is preferred to SQ. Interestingly enough, the cycle will not continue for ever. After P having beaten R it is no longer probable that SQ is preferred to P again. The citizens can learn about the efficiency properties of the pricing policy as time goes by. Thus, the size of the estimation errors will decrease. These cycles follow a systematic pattern: Sophisticated efficient policy proposals which originally do not command a majority may be introduced through apparently inefficient transitional steps. Such systematic cycles resemble other types of cycles discussed in the literature (see, e.g., Mueller, 1989, ch. 8). The difference, however, lies in the mechanism producing the distribution of votes necessary for a cycle. In the traditional approach, individual preferences are assumed to be appropriately distributed. In our case, the distribution of votes is generated by microeconomically explainable random errors. These cycles give way to various political strategies. For example, groups supporting the status quo may try to prevent direct comparisons between the status quo and simple alternatives; they favor optimal but complex solutions, as they know that such alternatives often have no chance to be introduced directly. Supporters of the optimal solution, however, will propose that first of all the status quo should be evaluated against a simple albeit non optimal alternative.

5. Institutions

The discussion has so far focused on simple majority rule and election mechanisms that do not allow voters to fully express their preference intensities. This section analyzes, how *institutions* determine on the one hand the expression of preference intensities and thus the incentives to fabricate dirty information, and on the other hand the cost of fabricating dirty information.

a. The incentives to fabricate dirty information

The better preference intensities can be expressed, the less effective is dirty information. When voters can fully express their preference intensities, dirty information has no effect, as the votes gained from those underestimating and the votes lost from those overestimating the benefits of a certain proposal counterbalance one another. In the following, the institutional conditions determining the expression of preference intensities are analyzed. A distinction is made between the expression of preference before and after the vote.

Ex ante expression

Various *voting rules* allow the citizens to express their preference intensities; a well known example is point voting (Mueller, 1989: 134f.). Such voting procedures are (at least implicitly) used in the political process of some countries. With regard to the election of the Swiss Nationalrat (the lower house), voters of most cantons can split their vote for different parties according to their preference intensities. A voter in the canton of Zürich, for instance, has 35 votes which he can allot to the different parties and candidates. But these voting procedures often degenerate to simple majority voting, as many voters give all their votes to one and the same party. Another institution, vote cumulation, where a voter may express his preference intensity by dedicating several votes to one candidate, is more successful. In Switzerland, again, this voting rule applies to the elections to the Nationalrat and to many cantonal parliaments. However, even these voting rules have asymmetrical consequences, as the voters are only allowed to vote for the candidates they like most and cannot explicitly vote against specific candidates. Voters can only express their "positive" preferences, but cannot articulate their "negative" preferences. Thus, some incentives to fabricate dirty information prevail.

The existence of *referenda* or *popular initiatives* also allows political entrepreneurs to specifically address voters with intensive preferences and to slow down the political process. This reduces the effect of dirty information, as the weight of intense preferences is increased and as random errors decrease over time as the voters gain more experience.

Logrolling may also serve to express preference intensities (Mueller, 1989: 82ff.). It only works in non-secret votes, e.g., in town meetings and some votes in parliaments and committees, but breaks down in secret votes (i.e. in elections and popular referenda) where exchange agreements cannot be enforced. Thus, it can be hypothesized that less dirty information is fabricated in non-secret than in secret votes.

An important mechanism by which preference intensities show up is the correlation of an individual's probability to vote and the intensity of its preferences. This mechanism works better, the lower and more variable voter turnout is. Consequently, dirty information is of less use to political actors when turnout is usually low but variable. Typically, those who mistakenly change their mind under the influence of dirty information have relative weak preferences. In contrast, those who make the opposite mistake have more intense preferences and vote with a higher probability.

However, preferences are not only expressed in referenda and elections but also by exit and voice at the individual and by interest groups at the aggregate level (see Hirschman, 1970; Frey, 1991). Again, the effectiveness of these options is institutionally determined. Freedom of demonstration enables the

citizens to express intense preferences and thus decreases the incentives to make use of dirty information. The same limiting effect on dirty information is caused by *exit*. If, e.g., voters overestimating the individual costs of subsidising the agricultural sector can easily take up the exit option, subsidies become difficult to finance. This, in turn, reduces the incentives of (e.g., agricultural) lobbying groups to disseminate dirty information.

Ex post expression

Policy measures can be better assessed after their implementation. Thus, the opposition by those overestimating the costs before implementation will decrease over time and the support of those underestimating the true cost will vanish. The citizens' and the interest groups' opportunities to repeatedly bring an issue on the political agenda is of crucial importance. This is made possible by popular referenda and by rules prescribing that certain proposals have to be put on the political agenda again after a prespecified time (e.g., "sunset" laws). The chances of a revision increase, and thus the incentives to fabricate dirty information decrease, the less the status quo is systematically favored, i.e. the lower the required majority is.

Parliamentary decisions lead to a particular ex post evaluation. The elected representatives have incentives to anticipate the ex post evaluation by their constituents as their reelection prospects depend on the ex post perspective the voters will adopt. One could even argue that this constitutes one of the essential differences between direct and representative democracy.[10]

b. The cost of dirty information

The cost of fabricating and targeting dirty information depends on the victims' efforts to de-bias dirty information and on the availability of channels suited to disseminate this type of information.

Incentives to de-bias dirty information

An individual's incentives to de-bias information are stronger, the higher he values the respective decision. Consequently, dirty information is relatively ineffective and therefore, unimportant in market settings. But the concept gains importance in the political process. A voter's incentives to be properly informed and, thus, to de-bias dirty information depend on his subjective, expected influence, i.e. on the number of voters, the expected closeness of the result and the utility difference between the alternatives. As is well known, these incentives are minimal in collective decisions (see Downs, 1957 for "rational ignorance" and Kirchgässner, 1992 for "low cost decisions"). However, they increase when the citizens can also use the information on political matters for private purposes. The private benefits of political information

are higher, for instance, the better the individual's exit options are. With exit options improving, political information increasingly becomes a private good because it is fundamental to the choice of residence (i.e. exit from one political unit and entry into another political unit). Thus, federalism strengthens democracy (see also Eichenberger, 1994). Its *exit options* and the *small scale decision unit* provide incentives to the voters to be effectively informed and to de-bias dirty information, thus reducing the incentives of the political actors to fabricate dirty information.

Information channels

An information channel is the better suited for dispersing dirty information the more costly it is for the citizens not to rely on this channel, i.e. the bigger the rent in consuming the medium, and the more difficult it is to filter out the dirty components within the whole informational flow. A newspaper within a perfectly competitive market can hardly disperse dirty information because individuals who feel "manipulated" can turn to competing newspapers without incurring any cost. Thus, it is easier to spread dirty information through a monopolized medium. Dirty information can even better be dispersed by media which are not actively chosen by individuals. This applies, for instance, to billboards or loudspeaker advertisement. Moreover, dirty information can be mixed with other information or with entertainment (with "infotainment" resulting), as it is often tried in television. Interestingly enough, in many countries such "forced information" is regulated or even forbidden. E.g., in many countries it is not allowed to combine politics and entertainment in television or radio broadcasts. This can be interpreted as a social reaction to the dirty information problem.

6. Conclusions

Individuals' random estimation errors and concomitant dirty information provide a route to explain the political power of information within a rational choice framework. It has been emphasized that additional information itself may increase the cost of gathering and processing information. It thus enlarges individuals' random estimation errors. Such non-systematic, individual errors have systematic effects on aggregate political outcomes, as they are weighted asymmetrically in most decision-making processes. This provides incentives to various actors to produce dirty and clean information. The benefits and costs of such information strategies depend on the aggregation rules. The fewer possibilities voters have to express their preference intensities, the larger are the effects of random errors on political outcomes and the more dirty information will be provided. This sheds new light on the role of interest group organization: Good organization helps to decrease the errors of members and to increase the errors of political opponents, and thus to enhance the political support for propositions favored by the interest group. The random errors and dirty information concept helps to explain various political phenomena which were explained so far with a multitude of – sometimes conflicting – theoretical approaches. It shows how the incentives to produce dirty information can be reduced and thus efficiency increased. Moreover, it illuminates the role of clean information. Political outcomes, i.e., the politico-economic equilibrium emerging, depend on the voters' information and knowledge on political matters that can be provided, e.g., by economic advisers and scholars.

Notes

1. Moreover, dirty information increases the individual information processing costs when it is costly for individuals not to be influenced by irrelevant or wrong information targeted at them.
2. It seems plausible that citizens will also react to biased information by voting more often against changes of the status quo and by abstaining more often from voting. Though such reactions would be significant for Political Economy, too, they will not be considered in this paper.
3. In the long run people will partly learn to de-bias information. As their incentives to be informed are small, there is no reason for them to learn to de-bias information perfectly. De-biasing is, however, easier, the more systematically information is biased. Thus, political actors with the bad reputation as being systematic liars have no great influence in the political process. Of course, rational political actors will take into account that they lose part of their good reputation when dispersing dirty information.
4. When groups are analyzed, the values on the vertical axis represent frequencies of the respective estimates.
5. See, e.g., for the US congress Mayhew (1971, 1974), Ferejohn (1977), Fiorina (1974, 1977) and Abramowitz (1980); and for US presidential elections Ferejohn and Calvert (1984). Wittman (1983) provides an excellent survey of the literature at that time.
6. The following considerations can also be applied to political issues in direct democracies, in that case the *status quo* plays a role similar to the incumbent's.
7. The results of the following considerations are robust with regard to the distribution of voters' preferences.
8. Another advantage of censorship from the point of view of the government could be that it helps the citizens to believe what they want to believe. For example, in wartime many citizens feel better if they do not know about the atrocities of their own army. Censorship, by suppressing related information, may help the citizens to ignore such facts.
9. However, if citizens dislike censorship, the positive effect on government popularity discussed above can be overcompensated.
10. It is important to note, however, that in direct democracies mechanisms may endogenously emerge which provide an ex ante estimation of the ex post evaluation. E.g., many political actors give formal voting recommendations and try to gain a reputation of being wise "voting advisers", which certainly includes to pay attention to ex post evaluations

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