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Robustness of public choice models of voting behavior

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Abstract. *Modern economics modeling practice involves highly unrealistic assumptions. Since testing such models is not always an easy enterprise, researchers face the problem of determining whether a result is dependent (or not) on the unrealistic details of the model. A solution for this problem is conducting robustness analysis. In its classical form, robustness analysis is a non-empirical method of confirmation – it raises our trust in a given result by implying it with from several different models. In this paper I argue that robustness analysis could be thought as a method of post-empirical failure. This form of robustness analysis involves assigning guilt for the empirical failure to a certain part of the model. Starting from this notion of robustness, I analyze a case of empirical failure from public choice theory or the economic approach of politics. Using the fundamental methodological principles of neoclassical economics, the first model of voting behavior implied that almost no one would vote. This was clearly an empirical failure. Public choice scholars faced the problem of either restraining the domain of their discipline or giving up to some of their neoclassical methodological features. The second solution was chosen and several different models of voting behavior were built. I will treat these models as a case for performing robustness analysis and I will determine which assumption from the original model is guilty for the empirical failure.*

Keywords: neoclassical economics; public choice theory; robustness analysis; rationality; voting behavior.

JEL Codes: D03.
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1. Unrealisticness of assumptions and robustness analysis

1.1. Robustness analysis: a brief description

In (2006) Weisberg started his paper on the problem of robustness analysis, by comparing physics with population biology: "Physical scientists can often construct and analyze models that are derived from fully developed, well-confirmed background theories. A scientist in possession of such a theory can be very confident about her ability to […] make accurate predictions with these models […]. Unfortunately, many phenomena, such as those studied by population biologists, have yet to be described by comprehensive theories, and it is unlikely that such theories will be developed in the near future [...]. Thus in population biology and other sciences that deal with highly complex systems, theorists generate multiple models for individual phenomena, all of which are idealized" (Weisberg, 2006, pp. 730-731).

As population biology, modern social science lacks fully developed, well-confirmed background theories and makes use of various idealized models. The drawback of this current practice is that researchers face the problem of determining "whether a result depends on the essentials of the model or on the details of the simplifying assumptions" (Levins, 1966, p. 423). The problem that the unrealisticness of assumptions poses could be solved in several ways. The neoclassical economics answer was Milton Friedman`s (1966) *F-twist*: if the predictions implied by our idealized models pass the empirical tests, the unrealisticness of assumptions is not a problem at all. So, if an idealized model works, then its idealizations are not problematic. This solution has several shortcomings though, and I will focus on only one of them here(1). It is not uncommon, as social scientist, to be in the position of having trouble to collect relevant data. In other words, testing our hypothesis is not always an easy enterprise. So we stick to the original problem: how do we know "how much distortion was introduced by each idealization" (Weisberg, 2006, p. 731)? Another answer came both from biology and economics(2). To address the issue in hand, social scientists could use a non-empirical technique – robustness analysis.

Robustness analysis applied to biological systems, as described by Levins (1966), is a method which treats "the same problem with several alternative models each with different simplifications but with a common biological assumption. Then, if the models, despite their different assumptions, lead to similar results we have what we call a robust theorem which is relatively free of the details of the model" (Levins, 1966, p. 423). In 1993, Levins gave a few new hints about the procedure he used in (1966). "The search for robustness as understood here is a valid strategy for separating the conclusions that depend on the common biological core of a model from the simplifications, distortions and omissions introduced to facilitate the analysis" (Levins, 1993, p. 554). The antecedent citation should be understood in the following way: first we should have several models and second, we should delimitate *C*, "the common part of all models, the core relationships we are either confident of or wish to test" (Levins, 1993, p. 553) and V_i, "the variable part of the model introduced for convenience or because it might hold for some cases" (Levins, 1993, p. 553) From these two parts of the models we could derive a robust result, which depends only by the common part *C*. So in Levins' terms, "we may strengthen our confidence in the implications of some assumptions by using ensembles of models that share a common core of these assumptions but also differ as widely as possible in assumptions about other aspects. Then the more the variable part spans the range of plausible assumptions, the more valid the claim that the conclusions shared by all of them depend on the constant part" (Levins, 1993, p. 553).

1.2. The goals of robustness analysis

Starting from Levins (1966), (1993) and his description of robustness analysis, there are few topics worth discussing. First of them is the view that robustness analysis is a tool that helps us to strengthen our belief in a given result. The idea that robustness should increase the epistemic credence in a result it was implicitly or explicitly expressed by Wimsatt (1980), (1981) and others. This seemed to be the (original) goal of robustness analysis. But there is another possible goal. In 1980 Wimsatt stressed that when we perform robustness analysis, "The models must be sufficiently similar that we can compare them, isolating their similarities and differences. If we cannot do this, we cannot […] «assign praise and blame» to individual component assumptions. We can only praise or blame each model as a whole" (Wimsatt, 1980, p. 310). This contention highlights that robustness has a feature of discovering the effects of each individual assumption from a model. So, the second goal of robustness analysis could be to assign the praise or the blame on particular assumptions. Both goals (strengthening the belief in a result and assigning blame or praise) are non-empirical tools which can help us when testing if a result is difficult or even not possible. And as Weisberg, Kuorikoski, Lehtinen and Marchionni (2010) pointed out, the impossibility or the increased difficulty in collecting data is not an unusual occurrence in current scientific practice. There is, though, another way. Assume that we build a model and the data for testing it are easily available. Suppose for the sake of the argument that the result is not compatible with observable facts (it fails the empirical test). Borrowing from Wimsatt`s (1980) method, choosing similar enough alternative models could help us to assign the blame for failing the empirical test, to certain assumptions. For this goal, Wimsatt`s formulation should be further specified. What actually is needed to perform *post testing robustness analysis* is a special kind of similarity. I argued elsewhere (2013a) that this kind of robustness is a method of elimination and it involves incremental modifications. In other words, we should split the models we use into two parts. One part should always remain constant and the other should vary. Further, the variable part should have one and only one member. In other words, we can "assign blame" only by varying models in respect to one and only one assumption at the time. If the result varies under different specifications of an assumption then we could have some information about the reasons of the empirical failure.

The second issue that should be discussed here concerns the problem of which kind of assumption should be varied. This brings on a discussion about peripheral and core assumptions. As Mäki (1994) noted, peripheral assumptions "serve to neutralize factors that are not regarded as central or essential to the phenomenon" (Mäki, 1994, p. 244). *e.g.* Galilei's vacuum assumption, or the perfect divisibility of goods assumption in neoclassical economics. Core assumptions "serve to sort out what is believed to be the most central force [...]" (Mäki, 1994, p. 244); for example, Galilei's statement that bodies are attracted by the gravitational field of the Earth, measured by parameter g, or the neoclassical economics assumption that agents maximize utility. Having this distinction in mind, and returning to Levins' (original) formulation, robustness seemed to be about the artificial particularities of a model. In other terms it seemed to be about what above was described as peripheral assumption. Moreover, it seems to be about a particular kind of peripheral assumptions – tractability assumptions. Defined by Hindriks in 2005, 2006, "tractability is a matter of solubility or of the efficiency of a solution. A problem is intractable if it cannot be solved; a problem is more tractable with a certain assumption than without it if it can be solved more easily or efficiently in that case"

(Hindriks, 2005, p. 392). Cartwright (2005, p. 131), Kuorikoski, Lehtinen, and Marchionni (2010, p. 548), strengthened the idea that robustness analysis should involve tractability assumptions (seen as peripheral assumptions). There are, though, two arguments against their position. First, the procedure I described above fits very well, both core and peripheral assumptions. If a model failed an empirical test there is no certainty that only our peripheral assumptions could be blamed. Second, even though many authors have seen tractability assumptions only as peripheral assumptions, there is no reason to think that a core assumption could not have some tractability features. In 2013b I argued that assumptions could have simultaneous functions. For example, the utility maximization postulate is a core assumption for many neoclassical models but it has tractability functions also. Without maximization, neoclassical models would be mathematically intractable. So, my contention here is that in order to perform robustness analysis as I define it, we should treat any unrealistic assumption as a possible suspect even if it is a core assumption with tractability functions in the model.

2. Robustness of public choice voting behavior models

In its classical form, robustness analysis is a single (or intra-author) or multiple authors' (or trans-authors) endeavor. The first class refers to robustness analysis conducted by an author who is consciously modifying his own models to determine if they hold under alternative specifications of its unrealistic assumptions. The second class refers to series of models which were built by different authors, the last of them trying to secure the results of his predecessors. Neoclassical (economics and its manifestations into other social sciences[(3)]), current research practice displays both forms. An example from the first class belongs to Olson (1965). The main argument of Olson's analysis was that individuals would not participate in the production of collective goods in large groups. This result was derived using the *homo oeconomicus* behavioral assumption. Olson felt, though, that he could get the same result from using altruistic maximizers. As Olson beautifully put it: "A man who tried to hold back a flood with a pail would probably be considered more of a crank than a saint, even by those he was trying to help" (Olson, 1965, p. 64). So, even with altruistic maximizers the result holds. From the second class (multiple-authors robustness) a good example is Becker`s (1962) paper. Here, Becker explored the robustness of the traditional theory of household behavior (a theory built by other authors) which predicted that "the demand curve for any commodity, real income held constant, must be negatively inclined" (Becker, 1962, pp. 2-3). For securing this result, Becker replaced the neoclassical postulate of utility maximization with two other behavioral specifications, irrational biased or random preferences. Becker argued that the result is robust because it held even without maximizing individuals(4).

In this paper I advocate a third way of doing robustness analysis. The case I choose for this endeavor starts with a model which failed to predict real behaviors. Therefore the subsequent models of the same phenomena were not meant to secure a result because there was no result to secure it in the first place. These latter models were actually meant to show that the approach is theoretically compatible with the observed facts. However, they could be used to isolate the sensitive parts of the original model and to assign the blame for the empirical failure. The voting behavior case from public choice theory fits this framework and it will make a good case study.

2.1. Public choice theory – introductory remarks

One of the most important aspects of the democratic process is citizens' voting behavior. Defined as "the application of economics to the study of politics" (Shugart, Razzolini, 2001, p. xxii), public choice theory started to model this behavior in the middle of the 20th century. Using the expected utility framework of modern micro (economics), Downs (1957) and later Tullock (1967), predicted that almost nobody will vote. This result was clearly at odds with reality. Economics standard tools apparently failed and its imperialistic claims(5) seemed to be out of place. This failure was highlighted by many critics of the approach. The voting behavior case was often considered "*the Achilles' heel of public choice theory"* (Udehn, 1992, p. 249), (Aldrich, 1997, p. 373). In a strong interpretation, this result meant that neoclassical economics (through one of its offspring, the public choice theory) is not fitted for explaining a very important behavior of the democratic process. In a weaker interpretation the problem was one of choosing between hard core methodological principles and peripheral ones. Of course, the opponents of public choice theory chose the strong interpretation and the supporters assumed the weaker one. While the former position was one of rejecting the approach, the later tried to keep the most important neoclassical methodological principles by losing some less important methodological features. Public choice scholars took this later path and chose to sacrifice the *homo oeconomicus* assumption by the sake of the much more important assumption of utility maximization. In this way, at least two important subsequent voting accounts appeared: the expressive voter models and the altruistic voter models. They both gave away something in exchange for protecting the methodological core of the public choice theory and they both could be used to argue for the causal importance of the behavioral assumption. In what follows I present these models and argue that their results are unrobust with respect to some features of their behavioral assumption.

2.2. The conventional model

As mentioned above, the story of public choice modeling of voting behavior begins with Downs (1957) and Tullock (1967). I will label it as *the pure rational choice voting model*. A few notations are needed(6): V stands for the set of actual voters in a particular election with v being the cardinality of V, R represents the reward that an individual voter receives from his act of voting, B is the differential benefit that an individual voter receives from the success of his more preferred candidate over his less preferred one, P is the probability that an individual, by voting, brings about the benefit B, with $0 \leq P \leq 1$ and C is the cost of the act of voting. With these notations, the calculus of voting formula is: $R = (BP) - C$. If $R > 0$, it is rational to vote and if $R \leq 0$, it is not rational to vote. If v is a large number and $C > 0$, the calculus of voting will predict zero or low turnout. Actually the probability (P) of being the decisive voter is so low that scholars like Meehl (1977), Sobel and Wagner (2004) anecdotally commented that it is more likely to be killed driving to the polls than being decisive. This conclusion was puzzling since the beginning because it was clear that actually many people vote. Are they irrational? In the following sections, I explore two negative public choice responses to this question.

2.3. The expressive voter model

Brennan and Buchanan (1984), Brennan and Lomasky (1985), (1987) developed the expressive voter theory as an alternative to the classical approach to voting behavior. The theory starts with Buchanan's (1954) argument that there is a difference between individual's voting choice and his/her choice in the market. As Buchanan (1954) noted, in the market, individuals choose between outcomes. This is not true about voting because in this case the outcome depends on the actions of all the other individuals. This means that voting is not instrumental in the same way market choices are. From this, citizens could have non-instrumental reasons for voting. As Brennan and Buchanan (1984) argued, the latter had expressive reasons for voting. In expressive account, voters might be seen as booing and cheering spectators at a sports event. They are not supporting their teams because they will, by doing so, affect the outcome of the game. These expressions of support or lack of support for a sports team or for political candidates are not instrumental but they are rational. Another point that needs to be made is that people are not only booing and cheering candidates when they vote. In (1985) Brennan and Lomasky building on Tullock's (1971) and on Adam Smith's (1759) argued that voting was an opportunity to express moral views that otherwise it would be costly to express. Talking about charity is cheap, but voting about it is also cheap: „Bakers who donate their wares to the hungry forgo the income that could have been achieved through selling the bread and will soon be out of business. But bakers who vote in favor of a program to compel bakers to donate some share of their output to the hungry do not bear a similar cost. All that is given up is the opportunity to vote against the program – because the vote has negligible impact on the political outcome" (Brennan, Lomaky, 1985, p. 198). Starting from all these, the two key points of the expressive account of voting behavior are that voters have true knowledge about the *p-term* and that they will choose to express otherwise costly views by talking and voting about them. If voting is cheap then people will buy it. The conclusion is, of course, that rational expressive people will vote[(7)].

2.4. The altruistic voter model

The *homo oeconomicus* assumption, used in the pure rational choice model of voting, is the behavioral rule in neoclassical economics models. The expressive account of voting behavior traded, as Brennan (2008) argued, the instrumental feature of *homo oeconomicus* for saving the more important, maximization assumption. Another trade is still possible. We could keep the maximization and the instrumental behavior assumptions and give up (totally or partly) to the self-interest feature of rationality. As Buchanan, Tullock (1962), Becker (1976), Sen (1977), Sugden (1982), Andreoni (1989), (1990) and others argued, altruism could also operationalize the utility maximization principle of modern economics. For the voting behavior case I will shortly review one such attempt. The first public choice mention of altruistic voting behavior was in Buchanan`s (1954) paper. He briefly noted that in a voting situation people could think about the welfare of the whole group. Later, Jankowski (2002), (2007) and Edlin, Gelman, Kaplan (2007) took this intuition to the scale of an altruistic model of voting behavior.

Edlin, Gelman, Kaplan (2007) began their analysis of voting behavior from the notion of individuals with social preferences. To have such preference means that when voting, you are considering the utility received by other members of the community. So, building on the pure rational choice model of voting behavior, Edlin, Gelman, Kaplan defined two kinds of benefits that an individual could receive by voting. The first is its self-interested benefit denoted by B_{ego}, and the second is its altruistic benefit denoted by B_{soc}. With these notations, the total benefit that a voter receives is given by the formula: $B = B_{ego} + \alpha N B_{soc}$ – where α is a discount factor which reflects the intuition that the altruistic benefit is a fraction of the self-interested benefit. If $\alpha = 0$ then the voter is purely self-interested; if $\alpha > 0$ then the voter has social preferences. For the first case the prediction of the pure rational choice model of voting behavior stands: almost nobody votes. For the second case though, the implication is that much more people vote. If I receive a benefit of, let's say $\alpha = 0.5$, then, even with a big electorate it will be probable that I vote. So the most important assumption here is that $\alpha > 0$ for most of the voters.

3. Robustness of the voting behavior case: discussion

Before any other qualification, I will rewrite the models in a form more suitable for robustness analysis. I will denote the first model by *A*, the second by *B*, the third by *C*, the behavioral assumptions by I, the structural assumptions by II and the two possible results by R_1 (not voting) and R_2 (voting).

A The classical model of voting behavior

I. Behavioral assumptions:

I.a1) Voters are *homo oeconomicus*;

I.a1.1) The formal behavioral assumption: voters are utility maximizers;

I.a1.2) The 1st operationalization: voters are self-interested;

I.a1.3) The 2nd operationalization: voters behave instrumentally.

II. Structural assumptions:

II.a1) The mass elections assumption: the number *V* of voters is very large;

II.a2) The low cost assumption: voting is a low cost decision.

III. Hidden or implied assumptions:

III.a.1) The behavioral uniformity assumption: all agents behave as described in I.

B. The expressive voter model

I. Behavioral assumptions:

I.b1) Voters are *expressive*;

I.b1.1) The formal behavioral assumption: voters are utility maximizers;

I.b1.2) The 1st operationalization: voters are self-interested;

I.b1.3) The 2nd operationalization: voters behave non-instrumentally.

II. Structural assumptions:

II.b1) The mass elections assumption: the number V of voters is very large;

II.b2) The low cost assumption: voting is a low cost decision.

III. Hidden or implied assumptions:

III.b.1) The behavioral uniformity assumption: all agents behave as described in I.

C. The altruistic voter model

I. Behavioral assumptions:

I.c1) Voters are *a mixture of altruism and egoism*;

I.c1.1) The formal behavioral assumption: voters are utility maximizers;

I.c1.2) The 1st operationalization: voters are self-interested but they have altruistic motivations also;

I.c1.3) The 2nd operationalization: voters behave instrumentally.

II. Structural assumptions:

II.c1) The mass elections assumption: the number V of voters is very large;

II.c2) The low cost assumption: voting is a low cost decision.

III. Hidden or implied assumptions:

III.c.1) The behavioral uniformity assumption: all agents behave as described in I.

The results: $A \rightarrow R_1, B \rightarrow R_2, C \rightarrow R_2$.

The models of voting behavior presented above have at least three properties that made them suitable for my version of robustness analysis. The first is their simple structure. There are few assumptions about factors which are exogenous to the individuals *i.e.* few structural assumptions. Together with the also few behavioral assumptions, they are very easy to manipulate in a robustness analysis. The second desirable property is that all structural assumptions are realistic. Modern democracies are almost everywhere capable to organize the elections so that voting is cheap. The probability to be decisive is also usually low. Modern democracies may be, in principle, as large as possible, and usually they are large. If *V* is large, then the probability of being decisive is low. This makes the *P* term to be realistic for almost any modern democratic state. Having realistic structural assumptions facilitates the analysis because there are fewer variations that should be studied. Finally, the third property is that the models are similar enough to allow the detection of problematic assumptions. This similarity is in terms of a common model structure. Here, there are two options. If we treat I – the set of behavioral assumptions – as having a single member (*I = I.a1, I = I.b1 and I = I.c1*) then we could perform robustness analysis on all three models at once. Still, if we consider that I's cardinality is three (as presented above) then the robustness analysis should be performed by grouping model *A* with model *B* and model *A* with model *C*.

Choosing the first way – performing robustness on all three models at once – is easy. Taking the behavioral assumption as the variable part of the model and the structural assumptions as their constant part, we get R_1 but also R_2. The conclusion is straightforward: the behavioral assumption is to be blamed for the empirical fallacy of the classical model. So using *homo oeconomicus* described as a self-interested, instrumental utility maximizer is problematic. The second way involves as I noted above, grouping *A* with *B* and *A* with *C*. For *A* and *B* the constant part is *II, III, I.a1.1 - I.b1.1* and *I.a1.2 - I.b1.2*. The variable part consists in I.a1.3 - I.b1.3. Changing I.a1.3 into I.b1.3 changes the result from R_1 into R_2, The same goes with A and C. The constant part is *II, III, I.a1.1 - I.c1.1* and *I.a1.3 - I.c1.3*. The variable part consists in *I.a1.2 - I.b1.2*. Changing *I.a1.2* into *I.b1.2* changes the result from R_1 into R_2. So both *I.a1.2* and *I.a1.3* are sensitive to alternative specifications. This means that they are both to be blamed for *A*'s empirical failure.

So, it is clear from the above discussion that the results are variable under different behavioral assumptions. The problem is magnified by adding non-public choice behavioral assumptions. For example, if we replace the *homo oeconomicus* assumption with irrational biased pro-voting individuals then the result changes again. The same happens with irrational random voters. My primary contention here is therefore that the problem of failed prediction of the first model of voting behavior was produced by its behavioral assumptions. The whole *I.a1* or its parts *I.a1.2* and *I.a1.3* are not peripheral assumptions, and even though they have tractability functions, they are actually core assumptions and they are part of the model's causal mechanism. Another important part in deriving R_1 is *III*, or what I called hidden or implied assumption. This is actually a feature of the whole neoclassical economics and politics: it assumes that there is behavioral uniformity across the entire model world. All agents are either *homo oeconomicus* or expressive and so on. If we change this feature and allow behavioral diversity, deduction will be impossible. Without knowing how many people are in each behavioral class we won't be able to predict turnout. We would get though (maybe) a better representation of the real world. Of course this would imply trading tractability and deduction-prediction for representation, but I won't discuss this problem here.

Notes

(1) For other critiques for Friedman's position see, for example, the Musgrave-Mäki-Hindriks typology of assumptions and my (2013b) subsequent discussion of it.

(2) Even though until recent times it was theorized only by biologists.

(3) In (1984) Stigler argued that neoclassical economics exported its core methodological principles into the traditional domain of other social sciences. He labeled this as being economics imperialism.

(4) Becker's result held with irrational households because it was implied by a structural variable: everybody`s revenues are limited so, when the prices are high, people – rational or irrational – will buy less.

(5) See note (3).

(6) I use a part of Riker's and Ordeshook (1968) notations because they are more suited for my analysis than Downs' (1957) original notations.

(7) They will even do so despite their interests. Brennan and Lomasky (1985) offer an example of voting for declaring war to a nation's foe. Nobody wants this war, but voters will express their patriotism and disdain for the antagonist and the result will be one that is in nobody's interest.

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