Economic models of voting: an empirical study on the electoral behavior in Romanian 2012 parliamentary elections

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Abstract. *This paper presents the results of an empirical research using data from 1276 questionnaires collected during the 2012 Romanian parliamentary elections. The goal of this research is to test some of the implications of several influential economic models of voting behavior: the calculus of voting model, the expressive voter model, the altruist voter model and the minimax regret model. Using χ^2 tests, residual analysis and logistic regression we argue that voters (instrumental or non-instrumental) deviate from the fundamental implications of the four economic models.*

Keywords: Public Choice Theory, Voting, Rational voter, Instrumental behavior, Non-instrumental behavior.

JEL Classification: D72.

1. Economic models of electoral behavior

To analyze the models of voting briefly mentioned in the abstract, we organize them by the instrumental/non-instrumental feature of their rationality assumption and by the choice criteria they use. The obtained classes are: 1.1) models of instrumental rationality: the calculus of voting model, the altruist voting model, 1.2) models of non-instrumental rationality: the civic duty model and the expressive voting model, and 1.3) the minimax regret model. The models that fall into 1.1) and 1.2) use the utility maximization principle as choice criteria, while the model that falls into 1.3) uses the minimax regret criteria. Since this is an important methodological discrepancy, we choose to separately address this model, even though it is an instrumental rationality model.

1.1. Models of instrumental rationality

1.1a. The calculus of voting model

The calculus of voting received its mature form from Tullock (1967). In the tradition of Downs (1957), Tullock (1967) modeled voting as an instrumental act and formalized it in a simple formula[1]: $R = pBA - C_{v\_}C_i$. Here R is the reward that an individual receives when she votes, B is the differential benefit that the individual receives when her preferred candidate wins the elections, p is the probability of an individual bringing about the benefit B with $0 \leq p \leq 1$; C_v stands for the cost of voting and C_i represents the cost of obtaining information about electoral alternatives. Finally, A is the voter's estimate of the accuracy of her judgement. As Tullock noted, this last term is usually ignored so we will (harmlessly) also ignore it. Note that we use a simplified version of Tullock's formula: $R = pB - C$. This form captures the core of the calculus of voting model: all voters are *homo economicus, i.e.* they are utility maximizers, they are instrumental in their actions (they vote to get R), they are selfish (there is no information about the welfare of other people in their utility functions). Also, all voters know the real value of p (*i.e.* the probability of being pivotal in mass elections) and they are all able to estimate the costs (C) and the benefits (B) of voting. From here, if $R > 0$ then she votes and if $R \leq 0$ she abstains. Using some of Tullock's (1967: p. 110) own example, let's suppose that the value of C is 1\$, the value of B is 10.000\$ (if my preferred candidate wins the elections) and the value of A is 50% (*i.e.* 0.5). Suppose also that the value of p is 0,000.000.1. From here, $(10.000\$ \times 0,000.000.1 \times 0,5) - 1\$= - 0,995\$$[2]. Since $R < 0$, voting is irrational. The argument in favor of this result is that its assumptions are apparently reasonable. Modern democracies generally succeed in cutting off voting costs (C) (polling stations are close enough for almost all voters, voting is organized on weekends etc.) the probability of being decisive (p) is usually very low in mass elections (as an effect of large electorates) and the individual benefits (B) of voting are rarely big enough to compensate for the interaction between the low value of p and (almost any) value of C. But if all these terms are realistic enough, it must be that the rationality assumptions used in the calculus of voting model should be scrutinized. In what follows we explore an alternative instrumental voting model which solve the paradox of voting by introducing altruism in voters' utility functions.

1.1b. The altruist voter model

The possibility of altruism had already been anticipated by Buchanan (1954) who postulated two preference scales, one purely individual and one which takes into account social values that the individual has, and contains information about other peoples' welfare. (Buchanan, 1954: p. 336). Hence, when voting, individuals may consider the welfare of the whole group. Moreover, despite grounding his model into the selfishness assumption, Downs (1957: p. 37), did not reject the operationalization of the utility maximization principle in the form of altruism. Later, Brennan and Buchanan (1984) described voters' utility function as including considerations about the welfare of other individuals simultaneously with non-instrumental aspects. However, a fully developed model of altruistic voting can be identified only with the works of Andreoni (1990) – Jankowski (2002). Andreoni (1990) analyzed two types of altruism, pure altruism and warm-glow altruism[3]. Later, Jankowski (2002) included these two types of altruism into a new equation of voting: $U_i = \frac{p[B_1+B_2]}{2} - C + D + W$, where p is the probability of casting the decisive vote, B (the total benefit of voter i) is the sum of her purely selfish benefit (B_1) and her purely altruistic benefit (B_2), W is voter's private benefit when she supports some transfer by voting (warm-glow altruism) and D is a term introduced by Ordeshook (1968) which refers to non-instrumental motivations. Edlin, Gelman and Kaplan (2007) proposed a similar way of constructing the B term. Their formula was $B = B_{ego} + \alpha B_{soc}$ where B_{ego} is voter's selfish benefit, B_{soc} is her altruistic benefit and α is a discount parameter capturing the intuition that B_{soc} is a fraction of B_{ego} (in other words, I derive more utility from my selfish benefit than from my altruistic benefit). Starting from this construction of B the equation of voting was the same as in the calculus of the voting model: $R = pB - C$. The structure of these two altruistic voting models is not the same. In the first case (Jankowski) voters' motivations are both instrumental (B_1, B_2, C) and non-instrumental (D, W). In the second case (Edlin, Gelman, Kaplan) voters' motivations are purely instrumental. Despite these difference though, what is common to these models is the fact that all voters know the true value of p and that they all have the ability to accurately estimate the values of B and C.

1.2. Non instrumental rationality models

Downs (1957, p.48) originally noted that the elections could be seen as devices for expressing preferences[4]. Tullock (1967: p. 101) also mentioned that non-instrumental motivations are important for explaining why some individuals gather information in order to vote. Despite these suggestions, an explicit attempt to introduce a non-instrumental factor into the equation of voting appears in Riker and Ordeshook (1968). Their form of voting equation was $R = pB - C + D$, where the last term – the non-instrumental one – D, could have, as Riker and Ordeshook (1969: p.28) noted, several meanings: the satisfaction from compliance with the ethic of voting, the satisfaction from affirming allegiance to the political system, the satisfaction from affirming partisan preference, the intrinsic satisfaction of deciding, going to the polls etc., the satisfaction of affirming one's efficacy in the political system. Hence, D is the set of all non-instrumental factors that could affect voting. In their (1968) paper, the authors insist upon

the first meaning of the term, civic duty. The second meaning received more attention from Fiorina (1976) and then from Brennan and Buchanan (1984), Brennan and Lomasky (1985). Brennan and Buchanan (1984) added an explicit non-instrumental term (V), to the voters' utility function: $U_i = U_i(X_i; G; X_j; V \dots)$. Here, U_i, the utility of the individual i, depends on her consumption of private goods (X_i), on the level of public goods provision (G), on other individuals' consumption level of private goods (X_j) and on the non-instrumental factor – the intrinsic consumption of voting (V), conceived as the opportunity to express partisan preferences. This (V) component was further studied by Brennan and Lomasky in an alternative understanding of voting as means to express moral sentiments[5]. In the first version (expressing partisan preferences) voting is seen as cheering and booing at a sports event. In the second version (expressing moral sentiments) voting is conceived as an opportunity to express support for certain values. Both versions share the basic underlying assumptions: voting is conceived as a consequenceless act – all voters know the value of p (which in mass elections is very low), they all accurately estimate de values of B și C, *i.e.* they are able to estimate the costs and benefits of voting. Moreover, all voters accurately estimate the value of D (no matter it refers to expressing moral sentiments, civic duty or other moral sentiments). This last aspect is essential to the capacity of the model to solve the paradox of voting, since the role of the D term is to cancel out the effect of non-participation produced by the instrumental terms.

1.3. The minimax regret model

An interesting solution which avoids the paradox of the calculus of voting is to replace the utility maximization principle with another choice criterion, the minimax regret (Ferejohn, Fiorina, 1974). In a simple presentation the minimax regret criterion states that for any pair of actions[6] a_i and for any states of the world s_j, the individual is able to compute the regret r_{ij} defined as the difference between (1) what the individual could have obtained in s_j provided she had perfect information about the results and chose the action with the maximum benefit and (2) what the individual obtains choosing a_i. This imply that for any action, individuals compute the maximum possible regret $max_j r_{ij}(s_j)$ choosing that action which is the **min**imum of these **max**imum regrets (*i.e.* minimax regret). This decision criterion does not take into account the likelihood that the 'worst result' will materialize but refers only to the possibility of that outcome. Applying this decision criterion to the issue of voting, the prediction is that turnout will be higher than the calculus of voting model implies. The main reason for this result which is (more) consistent with observable facts is that, in the event that the preferred candidate would lose by one vote, the regret experienced by the individual who chose not to vote, will be very high. Hence he has (instrumental) incentives to minimize his maximum possible regret[7]. Even though this model assumes that the probability of being decisive p is irrelevant, the basic structure of the model shares some elements with the above reviewed models. Minimax regret voters are also able to accurately estimate the values of B and C. Moreover, voting is conceived as an instrumental act and voters are seen as selfish agents (even though the minimax regret framework is consistent with selfless individuals[8]).

2. Methodology

The research uses data collected from a questionnaire applied during the Election Day of 2012 Romanian parliamentary elections. In building the questionnaire we aimed to identify anomalies (relative to the models reviewed above) of the preferences or of the subjects' state of knowledge. For instance, as pointed out in the first section of this paper, all the models assumed that voters are able to judge voting in terms of its costs and benefits – they are able to accurately estimate the values of C and B. Voters also (in the case of the models presented at 1.1a, 1.1b and 1.2) know the value of p – they are aware of the unlikeliness of their pivotality in mass elections. The questionnaire aims to identify the empirical support of each of these common elements[9], without ignoring the details of each model. The basic intuition of this research was that voters have multiple incoherent motivations and that the uniformity[10] assumed by all these models is not empirically founded.

The questionnaire was applied on the day of the Romanian parliamentary elections, on the 9th of December 2012 (outside the polling stations). Summed up, there were 1276 questionnaires applied in the following locations: Bucharest (one polling station in district 1 and 1 in district 4), Conțești and Răcari – Dâmbovița county (all polling station), Fierbinți and Axintele – Ialomița county (all polling stations), Glodeanu Siliștea – Buzău county (all polling stations). Obtaining a representative sample was impossible, given the difficulties in characterizing the total voting population. However, the sample size is quite varied in terms of respondents' socio-demographic characteristics, as shown in the charts below.
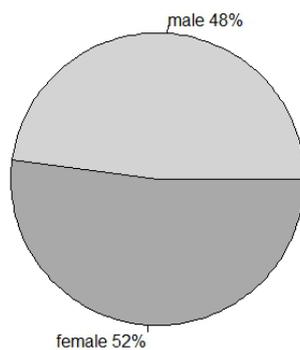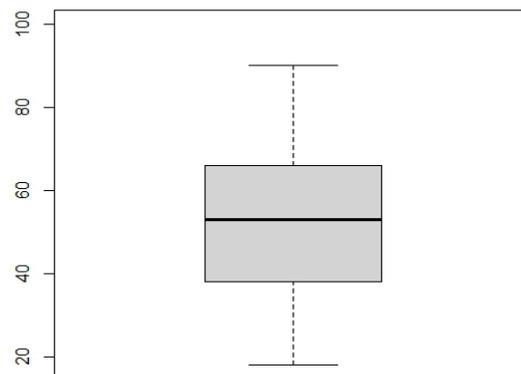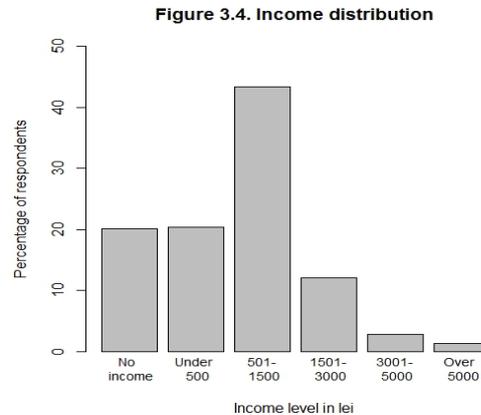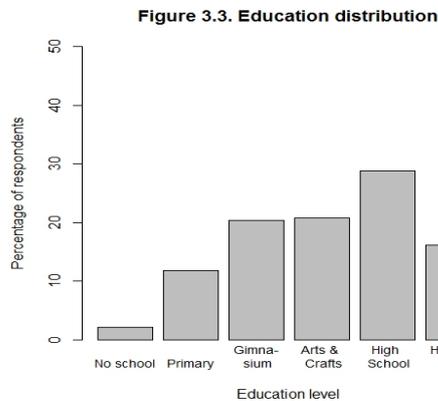

Figure 3.1. Gender distribution

male 48%

female 52%

Figure 3.2. Age distribution

Figure 3.3. Education distribution

Figure 3.4. Income distribution

In order to analyze the data, respondents were first classified into instrumental and non-instrumental voters, based on an open question about their reasons for deciding to vote. Subsequently, the instrumental category was divided into selfish and altruistic voters[11]. Building this typology of respondents was required by the need to study the correlation between voter's type and the respondent's perception of his probability of being decisive. This classification was necessary in order to allow us to study the extent to which the type of voter, determined by the voter's own declared motivation, is correlated with the voter's perception of the probability of being decisive, as well as the perception of the costs and benefits of voting. We also analyzed the association between the type of voter and the odds of having taken into account the regret hypothesis when having decided to vote.

We have used χ^2 tests for our analysis. These tests treat all variables as nominal and study the association between the variables in the analysis. Following the test, we have also done a residual analysis, because for variables with at least three categories, χ^2 tests can only indicate association without being able to indicate the categories between which this association exists. Based on the standardized difference between the observed and expected frequency, the residual analysis indicates the intensity of the association between the categories of two variables as well as the type of association. The type of association refers to a positive or negative relation between variables[12], however, in the case of nominal variables by association we mean a higher or lower probability of finding a response in one particular category of one variable, given the response category on the second. For example, if we study the association between women and voting for party A and discover a positive association, then we expect the probability of voting for A to be greater for women rather than men. If the association had been negative, then the interpretation would have been the other way around: men would have had a higher probability of voting for A than women.

The analysis also included a logistic regression. The purpose of the analysis is to determine whether the type of voter can be explained and predicted on the basis of the perception of costs, benefits and odds of the voter being decisive and also to determine the extent to which these voter profiles correspond to the theoretic predictions of the voting models described in section II of this paper.

3. Results

3.1. Analysis of association

The association analysis depicted in the table below, tests whether there is a significant association between the perception on the odds of being decisive [P], on costs[C], on benefits [B], on the regret hypothesis[R] and the type of voter. The type of voter has been operationalized either as being instrumental or non-instrumental, or as being instrumental egoist, instrumental altruist or non-instrumental. The perception on decisiveness [P], costs[C], benefits [B] and regrets[R] have been operationalized by two questionnaire questions each, as indicated in the table below by the letter in rectangular brackets at the beginning of each question. χ^2 tests and residual analyses have been run for each of the questions below and the type of voter.

Table 1. *Residual analysis of χ^2 tests, between voter type and different independent variables*

		χ^2	Non instrumental voters	Selfish voters	Altruist voters
[P]Before voting, has it ever occurred to you that without your vote your favorite candidate might lose the elections?	YES	16.701 (df=2, p=0.000)	-4.035	2.36	1.5
	NO		4.035	-2.36	-1.5
[C]Has it ever occurred to you that voting implies effort on your behalf?	YES	7.178 (df=2, p=0.000)	-2.278	-0.244	2.366
	NO		2.278	0.244	-2.366
[C]To what extent did you alter your plans in order to be able to vote today?	1(Not at all)	34.15 (df=8, p=0.000)	1.61	1.18	-2.65
	2		2.27	-1.79	-0.40
	3		1.59	-1.83	0.27
	4		-3.19	1.84	1.22
	5(To a very large extent)		-3.44	0.11	3.12
[B]Do you expect to be better off if your favorite candidate/candidates win?	YES	37.45 (df=2, p=0.000)	-6.09	2.21	3.51
	NO		6.09	-2.21	-3.51
[R]Have you taken into account this possible regret before coming to vote?	YES	1.25 (df=2, p=0.53)	0.94	-0.94	0.03
	NO		-0.94	0.94	-0.03
[B]I will be better off if my favorite candidate wins	1(Not at all)	58.58 (df=8, p=0.000)	4.70	-2.01	-2.43
	2		2.80	-0.004	-2.60
	3		3.16	-1.088	-1.89
	4		0.63	-0.40	-0.199
	5(To a very large extent)		-6.32	2.10	3.85
[P]To what extent do you agree with the following: "It doesn't make much difference if I personally go and vote, because so many people vote in elections"	1(Not at all)	18.73 (df=8, p=0.01)	2.04	0.5	-2.39
	2		1.32	-1.42	0.13
	3		0.79	-0.05	-0.68
	4		-0.99	-0.84	1.74
	5(To a very large extent)		-3.45	1.02	2.24
[R]Let's imagine that you had not voted today and your favorite candidate would have lost the elections by one vote. On a scale from 1 to 10, where 1 means "not regret at all" and 10 means "strongly regret", please advise the extent to which you would regret your decision to refrain from voting.	1[13] (Not at all)	28.17 (df=18, p=0.05)	1.32	-0.19	-1.05
	10 (To a very large extent)		-4.028	1.67	2.17

The χ^2 tests reveal a significant association between the perception on decisiveness and the type of voter. Unlike non-instrumental ones, the egoist voters tend to believe that without their vote their favorite candidate might lose. Although there is no significant relation for altruist voters (residuals are smaller than 2), when egoist and altruist voters are considered together, as instrumental voters, the analysis indicates a stronger association between the variables. On the other hand, instrumental altruist voters tend to believe it is not important to take part in mass elections because of how many people vote, while non-instrumental voters think it is still important to participate. Thus, it seems that non-instrumental voters do not think in terms of probability, while instrumental ones do, but are unable to correctly estimate it.

As far as costs go, there is a moderate positive association between instrumental voters and the perception of effort and a negative one for the non-instrumental (residuals of 2.28 in absolute value). However, for instrumental voters, the relation only holds in the case of altruist ones. Also, it is more likely that instrumental altruist voters have indicated altering their plans to vote, in comparison to non-instrumental ones. Thus, instrumental voters seem more likely to perceive the costs of voting but are also likely to be willing to suffer these costs, while non-instrumental ones do not seem to perceive them at all. Regarding the perception on benefits, there is a strong positive association between instrumental voters and the belief that their favorite will improve their own livelihood and that of the society as a whole. However, the relation does not hold for egoist voters when asked about the livelihood of the society. This might be because egoist voters do not include in their utility function the benefits for the rest of the society, while altruists do. As for regret, although instrumental voters would be more likely to regret having abstained if their favorite would have lost by one vote, there is no association between the type of voter and having taken this kind of scenario into account when deciding to go and vote in the general elections of the 9th of December.

In conclusion, the association analysis indicates significant differences between instrumental and non-instrumental voters in terms of the perception of decisiveness, costs and benefits, with instrumental voters being more likely than non-instrumental ones to make voting in terms of probability of being decisive, costs and benefits, although they also seem likely to overestimate the decisiveness probability and the benefits of having their favorite win.

3.2. Regression analysis

The results of this analysis are limited to indicating the extent to which, each of the variables is associated with a voter type. However, the association analysis between two variables does not control for the effect of the rest of the variables on the relation. Furthermore, this type of analysis does not account for the most influential factor for the characterization of the voter. Which of the three factors, the perception on the odds of being decisive, on the costs or on the benefits, carries the greatest weight when being used to predict the type of voter? In order to be able to answer such questions, a regression analysis is necessary. We have chosen to run a logistic regression model, where the dependent variable is dichotomous and refers to the type of voter which can be

either instrumental or non-instrumental[14]. The independent variables included in the study are as follows:

- frequency of past voting, with three response categories (*nearly every time, occasionally and never before*) which has been converted in two dummies (*every time and occasionally*) and choosing "*never before*" as the reference category;
- a dummy variable taking 1 for respondents who have taken into account the probability that their favorite would lose without their vote (*loss*);
- a dummy variable taking 1 for respondents who consider voting to involve effort (*effort*);
- an ordinal variables referring to the extent to which the voters have changed their plans in order to be able to go and vote (*plans*), with 5 response categories, where 5 means "to a very large extent" and 1 "not at all";
- a dummy variable which takes 1 for respondents who believe that their livelihood will improve if their favorite wins (improvement);
- a nominal variable regarding the voters' decision to continue to vote for their favorite, to vote for someone else or not to vote at all, when the expected vote difference in favor of some other candidate than their favorite is large. We have chosen the decision to abstain as the reference category and have transformed the two other categories in dummies *(the same, another)*;
- an ordinal variable with 5 steps which accounts for the respondent's agreement with the statement that too many people vote in elections, so no individual vote matters (it matters).

Table 2. *Regression results*

	Coefficients	Standard Error	Z score	Pr(>|z|)
intercept	-0.91	0.74	-1.22	0.22
every time	0.54	0.66	0.81	0.41
occasionally	-0.02	0.72	-0.03	0.98
loss	0.36	0.18	2.05	0.04 *
effort	0.09	0.19	0.48	0.63
plans	0.11	0.05	2.01	0.04*
improvement	1.11	0.24	4.64	0.00 ***
the same	-0.48	0.31	-1.55	0.12
another	-0.43	0.43	-0.99	0.31
it matters	0.11	0.05	2.34	0.02 *
Level of significance: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1				

The purpose of the regression analysis was to determine the conditions under which the probability of classifying a voter as instrumental or non-instrumental increases. Four independent variables have significant impact on the outcome: *loss, plans, improvement and it matters*. In comparison to non-instrumental voters, the instrumental ones have 44.33% more chances of believing that their favorite might lose without their vote, 11.62% more chances of changing their plans in order to vote and 2 times more chances of believing that their livelihood will improve if their favorite wins. At the same time, instrumental voters have 11.62% more chances of believing that it makes a difference if

you decide to take part in mass elections. The result is surprising and inconsistent with the predictions of the association analysis between the two variables. On the other hand, for both categories of voters, the median has the values of 1-"not at all". In other words, at least half of the respondents in each category reject the affirmation. Although it is more likely that instrumental voters would be in agreement with the affirmation, the probability of being in agreement to a large extent is quite small in all cases.

4. Conclusions

The purpose of this study was to test some of the implications and assumptions of some of the most influential economic models of electoral behavior in the context of the Romanian 2012 general elections. The conclusions of the association and regression analyses indicate that, based on their own motivation for going to vote, the respondents can be categorized in at least two categories: instrumental and non-instrumental. This distinction is also backed up by the respondents' perception of the probability of being decisive, of the costs and the benefits of voting. Instrumental voters tend to overestimate the odds of being decisive to a larger extent than non-instrumental ones. At least half of both categories believe that it is important to vote, but only instrumental voters believe that their favorite candidate might lose without their vote. Although only instrumental voters perceive the costs of voting, they also seem to be the ones willing to assume these costs, as they are the ones who declared having changed their plans in order to be able to go and vote. Instrumental voters also believe that their livelihood will improve if their favorite candidate wins. Instrumental voters seem to think of elections in terms of costs and benefits, perceive the costs and believe them to be quite high, but at the same time tend to overestimate their odds of being decisive. Therefore, if they were driven by instrumental motivations to vote, this is due to their inability of correctly estimating the value of p. On the other hand, non-instrumental voters tend to correctly estimate p, but they do not seem to perceive the costs and benefits of voting. They believe voting to be effortless and have not had to change their plans in order to vote, but do not believe that their life will improve should their favorite win. In conclusion, both categories break the voting models' assumptions, as the models are built on the voters' capacity of correctly estimating p, C and B. The same conclusion applies to the regret model, which is based on the voters' ability to estimate C and B.

Notes

[1] The notations are different from those used by Tullock (1967). In this form they are consistent with the notations frequently discussed in the public choice literature.

[2] If we give up to *A*, as mentioned above, the obtained value is incrementally higher, but the prediction is the same $R < 0$: $(10.000\$ \times 0,000.000.1) - 1\$ = -0,999$.

[3] The difference between pure altruism and warm-glow altruism is that the pure altruist invariant to the donors' identity, while the warm-glow altruist extracts utility from charity only if he is the donor. In other words, in the first case what it is important is the benefit received and not

the identity of the donor, while in the second case the donor's identity it is all that matters, irrespective to the receiver's welfare level.

(4) ... but he argued in favor of conceiving voting as instrumental to discriminate between alternative governments.

(5) As Kan, Yang (2001: p.297) and, Mueller (2003: p. 321), have shown, expressive voting was modeled into these two versions. Regarding voting as expression of moral sentiments it may be noticed its equivalence with Andreoni-Jankowski's warm-glow altruism (Hamlin and Jennings, 2011: p. 654).

(6) This presentation follows Dhillon, Peralta (2002: p. F337).

(7) Essential for the understanding of this model is Beck's (1975) (anecdotal) remark that "one should never cross a street to buy a newspaper" (Beck, 1975: p. 918).

(8) The argument can be extended by including considerations about other peoples' welfare. In this case the voter would include the utility of other individuals in his computation of maximum regret.

(9) Moreover the existence of these common parts presents an opportunity – it facilitates simultaneously testing several models' implications and assumptions.

(10) In the sense that all these models assume that voters uniformly know the value of the p, B, C terms.

(11) Where it was impossible to distinguish between an egoist and an altruist voter, the categorization has been done randomly. The reader must keep in mind that altruism was only considered in its instrumental version. Please see note 11 above.

(12) A positive association between two variables would imply that while the values of one variable increase, the values of the other should increase as well. For example, as the level of education increases, we expect the corresponding income to increase too. A negative association on the other hand would mean that while the values of one variable increase, the values of the other should decrease.

(13) In order to limit the table's dimensions, we will only report the residuals for categories 1 and 10.

(14) We have chosen to use the dichotomous classification of the voters, in instrumental and non-instrumental ones, given the fact that the association analysis has always returned significant results between all the independent variable and this classification. When dividing instrumental voters in egoists and altruists, the association sometimes is not significant.

References

Andreoni, J., 1990. Impure Altruism and Donations to Public Goods: A Theory of Warm-Glow Giving. *The Economic Journal*. 100(401). pp. 464-477.

Beck, N., 1975. The Paradox of Minimax Regret. *The American Political Science Review*, Vol. 69, No. 3, p. 918.

Brennan, G., Buchanan, J.M., 1984. Voter Choice: Evaluating Political Alternatives. *American Behavioral Scientist*. 28(2). pp. 185-201.

Brennan, G., Lomasky, L.E., 1985. The Impartial Spectator Goes to Washington: Toward a Smithian Theory of Electoral Behavior. *Economics and Philosophy*. No. 1, pp. 189-211.

Brennan, G., Lomasky, L.E., 1997. *Democracy and Decision: The Pure Theory of Electoral Preference*. Cambridge University Press.

Buchanan, J.M., 1954. Individual Choice in voting and the Market. *The Journal of Political Economy.* 62(4). pp. 334-343.

Dhillon, A., Peralta, S., 2002. Economic Theories of Voter Turnout. *The Economic Journal*, 112(480). pp. F332-F352.

Downs, A., 1957. *An Economic Theory of Democracy.* New York: Harper & Row.

Edlin, A., Gelman, A., Kaplan, N., 2007. Voting as Rational Choice: Why and How People Vote To Improve the Well-Being of Others. *Rationality and Society.* 19(3). pp. 293-314.

Ferejohn, J., Fiorina, M., 1974. The Paradox of Not Voting: A Decision Theoretic Analysis. *American Political Science Review.* No. 68. pp. 525-536.

Fiorina, M., 1976. The Voting Decision: Instrumental and Expressive Aspects. *Journal of Politics.* No. 38. pp. 390-415.

Fowler, J.H., Kam, C.D., 2007. Beyond the Self: Social Identity, Altruism, and Political Participation. *The Journal of Politics.* 69(03), pp. 813-827.

Hamlin, A., Jennings, C., 2011. Expressive Political Behavior: Foundation, Scope and Implications. *British Journal of Political Science.* Vol. 41. Issue 03. pp. 645-670.

Jankowski, R., 2002. Buying a Lottery Ticket to Help the Poor: Altruism, Civic Duty, and Self-interest in the Decision to Vote. *Rationality and Society.* 14(1). pp. 55-77.

Jankowski, R., 2007. Altruism and the Decision to Vote: Explaining and Testing High Voter Turnout. *Rationality and Society.* 19(1). pp. 5-34.

Kan, K., Yang, C.C., 2001. On expressive voting : Evidence from the 1988 U.S. presidential election. *Public Choice.* No. 108. pp. 295-312.

Mueller, D.C., 2003. *Public Choice III.* New York: Cambridge University Press.

Riker, W., Ordeshook, P., 1968. A Theory of the Calculus of Voting. *The American Political Science Review.* 62(1). pp. 25-42.

Tullock, G., 1967. *Toward a Mathematics of Politics.* Ann Arbor: The University of Michigan Press.