Brazilian Journals of Business

Rationality in decision-making: the effect of economic scenarios on voters' decisions

A racionalidade na tomada de decisão: o efeito de cenários econômicos na decisão de eleitores

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ABSTRACT
The agents' decisions related to investment, consumption, and other issues are influenced by economics conditions. Similarly, in a majority election, voters could decide based on the economic scenario. Considering this possibility, two hypotheses were formulated to explain reasons for the decision of the voters. The first situation relates to the possibility that the voters choose the option that reduces the possibility of loss. This formulation is based on the tendency of loss aversion built by Kahneman and Tversky (1979). The second is reducing the decision-making time; this hypothesis is based on the so-called shortcuts formulated by Kahneman, Slovic, and Tversky (1982). These hypotheses were built with the theoretical basis of the Theory of Rational Decisions and Behavioral Economics. The experiment had the participation of 21 classes and 446 undergraduate students of Economics, Management, and Accounting, involving exposure to an economic scenario and two candidates. The voters should choose the best choice available.

Keywords: decision-making, behavioral economics, voting, rationality.

RESUMO
As decisões dos agentes relacionadas a investimento, consumo e outras questões são influenciadas pelas condições econômicas. Da mesma forma, em uma eleição majoritária, os eleitores podem decidir com base no cenário econômico. Considerando essa possibilidade, foram formuladas duas hipóteses para explicar os motivos da decisão dos eleitores. A primeira situação diz respeito à possibilidade de os eleitores escolherem a opção que reduz a possibilidade de perda. Esta formulação é baseada na tendência de aversão à perda construída por Kahneman e Tversky (1979). O segundo é reduzir o tempo de tomada de decisão; essa hipótese é baseada nos chamados atalhos formulados por Kahneman, Slovic e Tversky (1982). Essas hipóteses foram construídas com a base teórica da Teoria das Decisões Racionais e da

Economia Comportamental. O experimento contou com a participação de 21 turmas e 446 estudantes de graduação em Economia, Gestão e Contabilidade, envolvendo exposição a um cenário econômico e dois candidatos. Os eleitores devem escolher a melhor opção disponível.

Palavras-chave: tomada de decisão, economia comportamental, votação, racionalidade.

1 INTRODUCTION

Studies of human decisions over the years have been developing new ways of thinking, creating room for academic areas such as Economics, Political Science and Marketing, as well as Psychology, to have the opportunity to improve their behavioral practices in analysis of human decisions. Experimental methods are used to arrive to a proper understanding of behavioral analysis, allowing for a full evaluation of axioms stemming from economic theories.

The experimental methods have been developed, improved, and extended in the second half of the twentieth century. One of the precursors of the first experiments in applied behavior studies of decision-making agents in economics was Vernon Smith (1962). (DAVIS & HOLT, 1993). Thus, experimental studies have gained prominence not only in economics and psychology but also in areas that are necessary behavioral information, where there is the need, or the choosing act of an agent for something. The area of market intelligence is a good improvement example of experimental methods, which has been allocated on a daily basis, in large companies or organizations to verify the acceptance of a product or service.

In the field of Economics, researchers like Kahneman, Slovic and Tversky have conducted experiments to evaluate the behavior of agents. Among these studies, there is one by Kahneman and Tversky (1979), which the authors found that individuals are more susceptible to losses than gains. Another result was verified in research conducted by Kahneman, Slovic, and Tversky (1982), where it was found that the time available for the decision is relevant to the rationality level establishment in the decision-making process, and the agents would be more rational in their choice if the time for the decision was reduced.

Behavioral studies are used to support the idea that the human being is predictably irrational (ARIELY, 2010) due to choices made every day and to determine the extent of the influence and means involved in decision-making analysis. As the agent faces its decision-making process, there are external influences which behavioral studies considers: i) the inability to process large amounts of information or situations that may require more attention; ii) and there is not always enough time and resources to the collection of a complete *report*, given the limited capacity of human intelligence.

With these considerations, in order to verify the influence of cognitive biases at the time of decision making**,** in this study using a scenario analysis to decide their votes, it is relevant to assess the

Brazilian Journals of Business

basis to how these decisions are made. Furthermore, a question emerges to be investigated: do economic scenarios have influence on voters' decision to choose a presidential candidate?

Based on these results the following hypotheses were formulated regarding the decision making of voters in a majority election when faced with an economic scenario:

Hypothesis 1 - Voters choose the option that reduces their loss possibilities.

Hypothesis 2 - When the time given for the decision-making voting process is reduced, the agents would be more rational in their choice.

The objective of this research is to test these two hypotheses with an experimental method conducted with undergraduate students. The election scenario was set in different ways and times and with different candidates running in the election two by two, as described in detail in section 3.

Following this introduction, the paper is organized as follows: in section 2, a theoretical discussion of the Rationality in Economic Sciences to develop the understanding of the hypotheses; in section 3, the described the experiment detail; and in section 4, a discussion of the results followed by conclusions.

2 RATIONALITY IN ECONOMICS

The study of rationality in economics has been discussed for years regarding the choices, in general, of economic agents. Robert Frank (1994), in Microeconomics and Behavior, describes that rationality implies that people "[...] make decisions according to the cost-benefit criterion [...]". (FRANK, 1994, p. 255). The principle of rational choice in the economy "[...] is a certain implicit or explicit cost-benefit calculus behind every action, objective and human behavior [...]" (FRANK 1994: p. 252), employed to maximize their usefulness. In short, "[...] the rational action is by minimizing the middle of the costs in relation to the return of the purposes [...]." (MEIRELES, 2012, p. 54).

Alfred Marshall (1985), in Principles of Economics, believes that the economy is concerned with the side on which man's conduct is more deliberate and such as when weighing the pros and cons of a particular stock before taking action. Thus, in all decisions man must perform the analysis of the cost-effectiveness of their actions.

The design of the rationality of economic agents strengthened with Von Neumann and Morgenstern (1944), consolidating the concept of rational economic behavior in decision-making; the authors found that based on the axiom of the rationality of decision makers, that the markets could not be foreseen or behave irrationally. The assumption for the decision maker is the idea "that their decision values and experience values coincide; starting from the concept of a decision maker designed that is

able to predict future experiences with perfect accuracy and thus evaluate the existing options." (KAHNEMAN e TVERSKY, 1982, p. 349).

2.1 BEHAVIORAL ECONOMICS

Behavioral Economics (EC) has been developing over the years as an alternative approach to the rational model of decision-making accepted by the traditional economy. It emerged as a critic to the traditional way which the decisions of agents are formulated by making a careful analysis of the cost-benefit, with a maximization of satisfaction, and of the assumption that a person's thinking ability is unlimited. The critics to the rational decision-making model have intensified since the second half of the twentieth century with the work of authors such as Herbert Simon (1972) and Kahneman and Tversky (1979). The contrary view arose in order to suggest that people do not always behave rationally, maximizing their satisfaction. For example, they have different behavior when they lose a movie ticket for a value of $ X or lose money of the same value $ X. (KAHNEMAN, 2011).

Herbert Simon (1947) considers that the analysis of a decision should be made with limits to behavioral options and their consequences. Decision makers do the best they can, given the limits of their cognitive ability to choose. In this way, the author argues that the decision makers have limitations on their skills in processing and analyzing information. In addition, in order to facilitate agents' decision-making, they frequently use shortcuts, also known as heuristics.

Behavioral Economics considers that agents are influenced by emotions, they have certain preferences, and the choice of a good or service is not always made in a rational way. Human beings do not act in order to analyze all costs in a given situation to maximize their usefulness, which would occur by doing the analysis of the decision scenario, seeking what might bring the greatest profit and disregarding what would not, because they want to avoid future loss.

However, as pointed out previously, decisions are susceptible to biases that ultimately lead the agents to make faster decisions and that require less effort of them, as humans are often exposed to influences that can undermine their ability to judge and act clearly. (KAHNEMAN, 2011).

Since rationality is considered by many as difficult to achieve, it is something desirable for decision making agents. However, it is not what necessarily occurs because the use of a calculation by the decision-maker suggests a longer reasoning. The consideration of the risks of decisions not only in short term but also medium and long term can generate nuisance to the mind, because agents are constantly pressed with time to accomplish a choice. This leads them to decide the easiest and most attractive options, and these can often become something like a trap and bring an unexpected result.

In order to demonstrate the techniques needed for the preparation of the experiment carried out in this paper, the next section approaches the development of the experimental method in the field of economics and political science.

2.2 THE DEVELOPMENT OF THE EXPERIMENTAL ANALYSIS METHOD

The development of an economic experiment is not only a test on any location, it requires control. Economics tests are more controlled and come from different rules for their implementation in order for the final result to be nearest to the truth. According to Davis and Holt (1993), for the experiment to become valid the environment and the procedure should be standardized for all sessions; and each session must have detailed instructions allowing the participating agents to perform the experiment without feeling cheated or fed with false hopes, because if it does, the procedure is not seen as credible. These specifications are one of the main differences in data collection through economic experimental analysis and a research opinion, for example.

It is noteworthy, that the experimental research method in the economics field has intensified over the years, seeking to unravel the axioms presented by economic theories and looking for improvements applicable to the methodologies of studies supported by its theories.

Usually, the researchers developing these procedures choose the element to be applied to the experimental method, checking what is the best for achieving their goals. Douglas Davis and Charles Holt (1993) consider that there are three objectives,: i) The Behavioral Hypothesis Test, in the way to build a lab environment that meets the structural hypothesis particular theory, is given the best possible chance to test its behavioral implications, using fake method; ii) The Theory of Stress Testing, performs the exam of sensitivity of a theory to violations of certain assumptions; iii) The search for Empirical Regularities refers to the type of experiments that seek to document unexpected regularities in the relationship between certain economics variables. (DAVIS & HOLT, 1993).

The procedure used in this paper is the behavioral hypothesis, one of the most used methods; it can be applied to sessions that aim to confirm the existence of certain phenomena or experiments aimed to test theoretical explanations of phenomena. (FLORES, 2012).

2.2.1 Economics experiments applied in political science

In recent years, the number and prevalence of experimental studies focused on issues of political process have grown rapidly, influenced by researchers engaging this field of knowledge as a way to use experimental techniques to unravel political phenomena. The growing interest in experiments is due to their usefulness in facilitating conclusions through procedures with participants in treatment (manipulation of prices, for example) or control groups (which are not exposed to the treatment). In its

entirety, the experiments can generate empirical claims, having the ability to change or open a new range of information about existing academic studies. (DRUKMAN, GREEN, KUKLINSKI & LUPIA, 2011).

The first experiments in the field of political science were identified after 1940, and the first experimental work was written by Samuel Eldersveld and published in American Political Science Review (APSR) in 1956. In this study, the author distributed randomly potential voters: control groups that received no message, or the treatment groups receiving messages encouraging them to vote through personal contact (which included phone calls or personal visits) or through correspondence. The study showed that there was a greater involvement of people who were in treatment groups (through personal contact), than of any control group or the correspondence group; the obtained results showed that personal contact caused a relative increase in the participation rate of users. (DRUKMAN, GREEN, KUKLINSKI & LUPIA, 2011). Using the decision-making as a basis in an election, it should be considered that the alternatives are already pre-determined, clear, and limited in number. These alternatives, which are the candidates, would strive to get the votes from the voters, making clear what they are thinking and doing in an attempt to avoid any doubt at the time that the decision must be made, even if there are different agents with diversity of political knowledge and experience in their ability to process political information. (LAU & LEVY, 1998).

In the economics field, the rational choice approach assumes that voters and candidates decide on a policy position among a set of alternatives based on rational calculation of self-interest; voters will calculate their preferences based on the attributes of each candidate, considering that the final decision is a rational choice to maximize their cost-benefit. (LAU & LEVY, 1998, p.32).

However, the researchers Richard Lau and Jack Levy (1998) consider that the rational decision model is outdated, especially by not considering that the human being has a limited cognitive capacity and that in its decisions, such as voting in an election, they are using heuristics. In addition, it should be considered that the vote can be influenced by family preferences, in a way that the voters end up deciding according to the preferences of their families without further trials of these decisions.

With the development of studies on heuristics - shortcuts - for decision-making (KAHNEMAN, SLOVIC & TVERSKY, 1982), the attempt to understand the decision process that cause these systematic deviations from the rational model and to evaluate the relative effectiveness of various cognitive heuristics is a big challenge for researchers of the political and economic area. In th context of the decision, "we must not only be concerned with the general standards of behavior but also the specific context in which the choices are made." (LAU & LEVY, 1998, p. 31).

The authors David Redlawsk & Richard Lau (2012) consider as determinants of the decision: i) the number of candidates - the decision is easier when there are only two candidates; ii) the similarity of

the candidate alternatives, that is, the more similar are their electoral proposals the more difficult to pick one candidate; iii) the time allowed for choosing, for a short time can press the final decision; and iv) the way the information is presented, as "[...] information rarely becomes available in an orderly, controllable manner, especially in the context of political decisions [...]". (REDLAWSK & LAU, 2012, p. 27). It appears then, that given the development of the experimental economic field in recent years, political scientists have joined the experiments performed in the laboratory with the goal to get better data collection and thus better understand "how" decisions are made by voters in an election.

In search for an ideal approach to the voting decision, Richard Lau & David Redlawsk (1997), in Voting Correctly, held an experiment in 1994 with about 300 people involving the verification of vote right in presidential elections. As it is difficult to set a good candidate for all, the beginning of the experiment predetermined "correct" choices based on the values and beliefs of each voter, and not on a particular ideology that assumes the values and preferences that a particular class must have. However, strictly based on full information conditions on the candidates, and for general information purposes about 70% of the participants held the vote considered correct. (LAU & REDLAWSK, 1997).

After the experiment of Richard Lau & David Redlawsk, seeking a wider line on the perception of a voter on the economy, researchers Daniel Hopkins & Lindsay Pettingill (2015) conducted an analysis of the decisions of voters in local elections, considering the performance of the local economy as the basis for the decision of the vote. When elections were for national or state levels, a massive amount of information was available regarding the country or state economy, which arrived through the media, but in local elections, the media minimally addressed these issues. One of the results showed that voters when they had no economic information mostly used his personal finances to identify the vote that they would consider correct. (HOPKINS & PETTINGILL, 2015). After these studies, it was possible to verify the relevance of the experimental method to understand more clearly how voters' decisions are formed. The increasing use of experimental tools has opened a new range of opportunities for different areas of study beyond economics.

Still, through the studies of Simon (1978), Kahneman & Tversky (1979), new influences began to emerge and the Theory of Behavioral Decision comes up with a new vision of choice. Heuristics are considered shortcuts that people use to make a decision (LAU, ANDERSEN & REDLAWSK, 2008) leading to new questions regarding the Theory of Rational Choice and its actual evidence in the experimental field.

3 METHODOLOGY

The analysis of this research is based on an experiment conducted with 446 undergraduate students of the School of Management and Business of a University, aiming to understand the aspects

related to the behavior of voters in deciding between two candidates running for an election presented as presidential candidates. The sample consisted of undergraduate students as voters and as candidates, with chosen candidates' people of good verbal communication skills so that information could clearly be transmitted to participants. (LIMA, GOSLING & MATOS, 2008).

3.1 SELECTION PROCESS AND DESCRIPTION OF THE PARTICIPANTS

After the authorization of the university's ethics committee for the experiment, the selection criteria for the participants were: a) be 18 years or more; b) be an undergraduate student in the School of Business Management at the University; c) have the subject teacher's consent to the experiment with their students. After completing these questions, the student's participation can only become valid with his signature on the Term of Consent Clear and Clarified of the Experiment.

3.1.1 Voters

Voters should be undergraduate students of the School of Management and Business at the University. The students were consulted in the classroom through a prior authorization from the coordination course that the student belonged to the subject teacher. Furthermore, the longer economic experiment took 25 minutes.

3.1.2 Candidates

The candidates should be students of the faculty of economics, being called candidate A (Ca) and candidate B (Cb). The choice of these candidates were based on two different profiles set. These candidates were pre-selected with support and indication of the coordination of undergraduate and graduate college of economics and the academic course of that directory. After this preselection, an interview with them to check the availability of part of the experiment was performed.

3.2 ELECTORAL PROCESSES

The electoral processes had the objective to apply different procedures in order to test if a change in any procedure could produce some variation in the results. Altogether three different processes were applied on a total of 446 students. More information about the time of implementation and results obtained in each class can be found in Appendix B.

3.2.1 General description of objects

Economic Scenario: It is the description of the current situation in the country. The information was distributed in printed way to the students in each procedure. In the scenario the following data variables were considered annually: GDP growth rate, the percentage of public debt to GDP, the basic interest rate, inflation, exchange rate and unemployment rate.

Candidate Proposition: It consists of two distinct economics policies on which each candidate stands to be elected as president.

Session: Location where the experiment was performed, as each group of voters consists of a separate session.

3.2.2 Description of the voting process

Three different procedures in these electoral processes were administered:

- Procedure 1: The purpose of the experiment was presented to participants, the Term of Consent Clear and Clarified of the Experiment (TCCE) distributed for signature and after signing, with the participants interested in participating in the experiment, an analysis of the economic scenario was shown and the two candidates presented their proposals, each with a maximum of two minutes of defense, and after that the voting process was held.

- Procedure 2: The purpose of the experiment was presented to participants, the Term of Consent Clear and Clarified of the Experiment (TCCE) distributed for signature and after signing, with the participants interested in participating in the experiment, an analysis of the economic scenario was shown and the two candidates presented their proposals, each with a maximum of two minutes of defense. After that, the participants were allowed to talk with each other for one minute about the two candidates with the other classmates, but they should not ask questions to the candidates and after that the voting process was held.

- Procedure 3: The purpose of the experiment was presented to participants, the Term of Consent Clear and Clarified of the Experiment (TCCE) distributed for signature and after signing, with the participants interested in participating in the experiment, an analysis of the economic scenario was shown and the two candidates presented their proposals, each with a maximum of two minutes of defense. After that the following procedure was equal to procedure 2, however, in addition to the voters talking with each other, they could also talk with the candidates, and after that the voting process was held.

These different formats intended to verify that with the changes in the patterns of the electoral process the final results of the procedures would have some variation. Thus, the first had a limitation to the voters, only proposals without the possibility of dialogue with the candidates, allowing only information of one side and could leave voters with questions for the choice making of the chosen candidate. The second allowed voters to interact with the other participants about their opinions regarding the proposals of each candidate, and the issue of communication as a tool for their decision.

Brazilian Journals of Business

In addition, the third case allowed an extra layer of information input with questions directed either to other participants as to the candidates.

4 RESULTS ANALYSES

There were 21 elections processes, one in each different discipline, which involved 446 students, divided in majors as Business, Economics and Accounting. This number was higher than expected (300), which allows for a more systematic evaluation of the data in terms of the stability of the results and for the ability to perform some generalizations.

Of these 21, the first group, considered the pilot, was excluded from the analysis since it would be based only to improve other experiments in other classes. It should be noted that the candidates chosen for a session were not colleagues of the others in that discipline; the TCCE presentation was read in conjunction with the participants and they were asked if they had doubts and if they understood the purpose of the experiment. As the economic scenario, it was emphasized that the scenario was fictitious and the country in question was fictitious, in order to not confuse the participants in incorporating the information in the economic scenario as being of their own country.

In conducting the 21 experiments, among the ten candidates who participated in the sessions, six candidates were female, and four candidates were male. Three of these were Master Economics students and seven were students of the Economics undergraduate program. It is important to note that the "candidates" stand for different political platforms.

One candidate represented the Proposition 1, an optimistic proposal that focuses on the short term by emphasizing state spending. The other candidate, representing Proposition 2, considers economic constraints, establishing the need for adjustments in the economy so that in the medium term, the economy is expected to grow. To avoid gender or charisma in the decision of the vote, the experiments were conducted only with candidate male or female and the candidates were changed in terms of proposals in different classes. During the voting process, it was possible to verify that candidates could convey concisely their respective roles, did not grow insecure at any time or struggle to express themselves.

The sessions progressed in sequence, with three different procedures, such as the procedure 1, in which the students could not question the candidates and not talk to each other; Procedure 2, in which the students could talk to each other and then vote and the Procedure 3, in which students could talk to each other and question the candidates regarding their proposals. These different methods had been established with the aim to test different forms of voting, looking to find out if changes in the final tallies

would correlate with the facilitation a higher level of communication (HOPKINS & PETTINGILL, 2015) among voters.

It was stipulated also that the correct/rational vote (LAU & REDLAWSK, 1997), after the analysis of the economic scenario, was for the participants to take the Proposition 2, even though it was a policy with short-term adjustments, the medium term aimed to aid the country's growth. It was made clear that this proposition was chosen as the most rational due to forecasts of economic indicators for the next four years, requiring harsh measures of spending restraint, to resume growth.

4.1 ECONOMIC SCENARIO [APPENDIX A]

The vote caused by loss aversion would take place by majority vote on Proposition 1, because it guarantees the generation of employment to population, higher incomes and government intervention in the economy and continued growth despite the economic scenario being shown otherwise in their predictions.

The objective in doing these experiments with students of the School of Management and Business at the University was to investigate the participants' knowledge in comprehending the economic scenarios, it is understood that they would have the ability to understand and interpret the economic indicators exposed.

4.2 RESULT OF THE ELECTORAL PROCESS

One of the hypotheses employed in this experiment was the loss aversion (KAHNEMAN & TVERSKY, 1979), which supports the assertion that individuals are more sensitive to losses than to gains. The loss (in Proposition 2 case) would result in a higher refusal of the students, because the short term would require tight control of public spending and investment only in effective demand sectors of the economy and would not fight unemployment in other sectors that were passing through difficulties, due to demand nurtured in times of incentives for consumption. This would consequently generate a budget constraint for people engaged in sectors where layoffs were taking place, requiring that these people could be placed in the medium term in other companies that would generate productivity and facilitate the economic development of the country.

It was expected that the Proposition 1, the optimist, would be the winner as grounded in the introduction. The candidate of the proposal advocated the need for greater performance of the government in the economy, which is the main credit facilitator for people with ways to stimulate economic production and employment generation.

However, the Proposition 2 was the one that had the highest number of votes, with 52.65% of the total votes. As the Proposition 2, the candidates point out the economic data, emphasizing that the scenario was not favorable, would require short-term adjustments, and the benefits of this policy would only be felt in the medium and long term; therefore, it was expected that voters would refute this choice.

Therefore, these results go against loss aversion (KAHNEMAN & TVERSKY, 1979) which tell us that people are more sensitive to losses than to gains, applied to the experiment carried out, the loss giving would be the proposition of economic restrictions, rather than the pessimistic choice. Considering that it would, at first, bring a cut to the government spending and a reassessment of economic measures, bringing some losses in a short term to the society.

Nevertheless, the choice accepted as a tendency to loss aversion, would be the choice of participants for Proposition 1, which in the short term promised facilitation of credit as a means of generating new jobs and economic development, even with forecasts being pessimistic about the economic scenario. The checks of the data obtained from the descriptive statistics of the results are shown in Table 1.

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Table 1 - Descriptive statistic of the results on the economics experiments

Variable	Observations	Mean	Std. Dev.	Min	Max
Sample	20	21.7	11.2	3.0	42.0
Proposition 1	20	9.4	7.3	2.0	28.0
Proposition 2	20	12.1	8.8	1.0	34.0
Duration of section (min.)	20	16.4	4.2	10.0	25.0
Economic class	20	0.3	0.4	0.0	1.0
Candidate gender (feminine)	20	0.7	0.5	0.0	1.0
Null	20	0.2	0.5	0.0	2.0

Source: Elaborate by the author, data from the experiments. Using Stata.

When analyzing the data collected and separating them by procedure model performed, the results of the procedure 1 show that 53.73% of voters opted for the proposition 2. Although it is noted that this procedure was the fastest and did not let the voters communicate with each other before the vote decision. A possible explanation for this result would be that voters usually make better decisions with little information, therefore this conclusion goes against the theory of rational decisions (REDLAWSK & LAU, 2012). But using the assumption of heuristics or shortcuts (KAHNEMAN, SLOVIC & TVERSKY, 1982) for quick decision making, it had supported the conclusion that people can make better decisions in a short time of their evaluation (LAU & REDLAWSK , 2006).

Brazilian Journals of Business

For the results of votes of procedure 2, it was found that the majority of voters, 53.88% voted for the proposition 1; this procedure allowed people to talk to each other to reach a conclusion before the vote. Therefore, the presence of group thought (KOERBER & NECK, 2003) suggests that there is a failure to assess the risk of a selected alternative, and it may restrict critical thinking of the group members, in a way that the easiest options are the preferred. In the case of experiment choices of this paper, the easiest option to be chosen without risk analysis of economic scenarios was the proposition 1.

However, taking into account the procedure 3 results (62.41% - for the proposition 2), it is clear that the greater is the information that the voter has from the candidates themselves, the choice can become more critical. With this procedure the participants have the opportunity to communicate with each other and they could question the candidates. When there is acquisition of complete information to the decision-makers - through communication among the group and the questioning of the candidates – it is posited that cognitive deviation is minimized due to information being processed in a more controlled way. The questions and doubts are resolved directly with the candidates and not left only within the group (REDLAWSK & LAU, 2012), avoiding information confusion.

From this data overview, in the next section, the levels of reliability and stability of the results are addressed for a better understanding on a statistical level.

4.3 STATISTICAL RESULTS VERIFICATION

According to the evaluations carried out on the previous sections, the data was collected from the 20 classes and 434 students. Speculating to expand the results to find a generalization, based on the stability of the results, it shall not represent at 5% of significance that the result would remain if the sample was changed. This occurs because the study did not use the entire population to fully trust the results and needed to estimate the confidence interval of 95%.

The results show that the proposition 1, with the result of 46.31% being a central measure, has a margin for the confidence interval not above 56.47% and not below 36.15%. The same goes for proposition 2, with the center measure of 52.65% and its minimum and maximum respectively, 42.36% and 62.94%. These data show that there is the possibility of cross values which could lead to a reversal of the winning choice or even a tie.

For the analysis of the dependency ratio of a variable related to another, it was estimated in the matrix correlation between the main experiment data. The results are shown in table 2.

Brazilian Journals of Business

Table 2 - Matrix correlation of the main values of the sample

	Dura_min	Sample	n Pa1	(%) Proposition 1	n Pa2	(%) Proposition 2	n Null	(%) Null
Dura_min	1,0000							
Sample	0,7941	1,0000						
n Pa1	0,4702	0,6329	1,0000					
(%) Proposition 1	-0,2622	-0,2803	0,5051	1,0000				
n Pa2	0,6360	0,7613	-0,0180	-0,7795	1,0000			
(%) Proposition 2	0,2753	0,2875	-0,4992	-0,9914	0,7915	1,0000		
n Null	-0,1334	-0,0698	0,0333	0,0550	-0,1764	-0,1841	1,0000	
(%) Null	-0,1257	-0,0822	0,0049	0,0328	-0,1682	-0,1634	0,9905	1,0000

Source: Elaborate by the author, data from the experiments.

Consider:

Dura_min: Duration of the experiment in minutes.

Sample: Quantity of participants of the experiments.

n Pa1: Quantity of participants that voted in proposition 1.

(%) Proposition 1: Average of participants that voted in the proposition 1.

n Pa2: Quantity of participants that voted in proposition 2.

(%) Proposition 2: Average of participants that voted in the proposition 2.

n Null: Quantity of participants that voted null.

(%) Null: Average of participants that voted null.

Analyzing the data above, the level of strong positive correlation between the size of the sample and duration of the experiment can be observed (0.7941), indicating that most of the pairs of values of the variables are located near a line with a positive slope.

It is important to note that the time analyzed includes the participants' explanation period of the experiments and the signature of the Term of Consent Clear and Clarified of the Experiment (TCCE). As there were experiments with a large number of people, the number of participants affected the time of the experiments' realization, due to a longer period of session explanation about the purpose of the experiment and the voting method. It should also take into account the different procedures performed; there was the procedure 1 (with no possibility of communication between participants), procedure 2 (with only communication between colleagues) and procedure 3 (with communication between participants and candidates), with the latter taking a longer time in all classes.

Although, even with the time difference of the experiments between the classes, the time required from the start of the candidates' speech has not been altered in any class. All students were given the same time to analyze the candidates' proposals and depending on the procedure, the same time communication between colleagues or between colleagues and candidates.

Brazilian Journals of Business

Aiming to analyze the t-test for averages, the data was estimated regarding the average of the results of proposition 1 and the average of the results of proposition 2, as can be verified on Table 3.

Table 3 - T test for the experiments

	Proposition 1	Proposition 2
Average	46,3134799	52,648285
Variance	471,220462	483,62807
Comments	20	20
Average difference Hypothesis	0	
gl	38	
Stat t	-0,9168135	
P (T <= t) one-tailed	0,1825113	
t Critical one-tailed	1,68595446	
P (T <= t) two-tailed	0,3650226	
t critical two-tailed	2,02439415	

Source: Elaborate by the author, data from the experiments.

In the t-test of the average for the experiments without distributing them by gender, it was found that there is no average difference as p-value resulted in 0.365, i.e., it accepts the null hypothesis of H0 = the average being equal.

Following this, a t-test of the average related to the gender of candidates was conducted considering the hypothesis H0 = averages are equal and H1 = averages are different. In table 4 were checked the values of t-test for the averages of the experiments with female candidates.

Table 4 - T test for the experiments with female candidates

	Proposition 1	Proposition 2
Average	51,26196	47,1407547
Variance	384,62839	386,180765
Comments	13	13
Average difference Hypothesis	0	
gl	24	
Stat t	0,5352079	
P (T <= t) one-tailed	0,2987154	
t Critical one-tailed	1,7108821	
P (T <= t) two-tailed	0,5974309	
t critical two-tailed	2,0638985	

Source: Elaborate by the author, data from the experiments.

As p-value equals 0.597, it was rejected the hypothesis of H1, that is, there is no difference of averages. In addition, by analyzing the data from the results of the sections with women as candidates, it was found that the majority of votes, 51.26% went to the candidate who was defending the proposition

1. One possible explanation of such results would be the study of decisions between candidates of different genders (CARLI, 200; RUDMAN & GLICK, 2001) which claim that people show more receptiveness to female gender when a woman shows favorable information. It is represented as a collaborative person who wants to help others without expressing any negative information; and the reverse are shown to women who tend to show negative information that somehow threatens the welfare of the voter (CARLI, 200; RUDMAN & Glick , 2001). In one of the classes in which the procedure 2 was performed, with female candidates, it was noticed that there was some objection from participants in voting on proposition 2, because the candidate who defended it turned out to be quite pessimistic, and did not offer much positive information.

The t-test of the average related with the male candidates, the values obtained are shown in Table 5.

Table 5 - T test for the experiments with male candidates

	Proposition 1	Proposition 2
Average	37,123445	62,8765549
Variance	571,35233	571,352332
Comments	7	7
Average difference Hypothesis	0	
gl	12	
Stat t	-2,015634	
P (T <= t) one-tailed	0,0333978	
t Critical one-tailed	1,7822875	
P (T <= t) two-tailed	0,0667957	
t critical two-tailed	2,1788128	

Source: Elaborate by the author, data from the experiments.

The t-test for the experiments average with male candidates, resulted in a p-value equal to 0.0667. Therefore the hypothesis was rejected of averages being equal (H0), with significantly different results at 95% confidence. It shows a majority of votes, 62.88%, were for the candidate who was defending proposition 2. This result reveals that information deemed bad or in some way threatening to the voter welfare are better resembled with the male figure (CARLI, 2001).

Through studies regarding communication between the gender difference (CARLI, 200; RUDMAN & GLICK, 2001), it shows that optimistic proposals when submitted by women, have a higher acceptability than a negative or pessimistic proposition. The female is seen as a symbol of comforting news and not otherwise. However, the propositions presented by males have no degree of differentiation; the voter generally had received both negative and positive information and had analyzed it the same way. It can also be said that in the eyes of the voter when candidates are male, the level of analysis ends up being more rational.

Brazilian Journals of Business

To test that assumption, it was estimated a simple OLS -Ordinary Least Square Regression considering the dependent variable the proposition 1 and considering the duration of the section, the candidate gender and if the class is from students of the economic department.

Table 6 - OLS Estimation for Proposition 1 Determinants

Dependent variable: Proposition 1	Coef.	Std. Err.	t	P>t	[95% Conf.	Interval]
Duration of section (min.)	1.085	0.371	2.930	0.010	0.299	1.870
Candidate gender (feminine)	6.273	3.220	1.950	0.069	-0.553	13.099
Economic class	-0.342	3.303	-0.100	0.919	-7.343	6.660
constant	-12.378	7.329	-1.690	0.111	-27.914	3.158

Source: Estimated with Stata. R-square= 0.371 and Adjusted R-squared= 0.253.

As represented in table 6, the candidate being a female gender impact positively in the choice of Proposition 1. The duration of the experiment also is statistically significant with p-value less than 0.10 and impacting positively in the Proposition 1. However, the economic students negative impact in the choice of preposition 1, is not statistically significant.

5 CONCLUSION

Through the results, it was possible to test the hypothesis of loss aversion (KAHNEMAN & TVERSKY, 1979), which specifies that people are more susceptible to losses than to gains, in the case of the experiment the loss would occur by the choice of the proposition 2 (pessimistic). This choice defended that the scenario was not favorable and required short-term adjustments and the benefits of this policy only would be felt in the medium and long term, so it was expected that voters would refute this choice. However, this proposal had the highest concentration of votes, and it can be seen that in most cases, the students used the rational model of decision-making and effectively voted in order to choose the most rational choice.

In the same way, the second hypothesis related to shortcuts (KAHNEMAN, SLOVIC & TVERSKY, 1982) for decision making was considered, which holds that people are more critical in a short time assessment of a decision (LAU & REDLAWSK, 2006). Already, based on the procedure 3, it was found that the higher the level of communication between voters and candidates, there is a greater chance of people making more rational decisions and positioning themselves better critically about the data presented to them.

However, considering procedure 2 results, it was found that when people have more time for communications and group chat (KOERBER & NECK, 2003) on the best offer, there is a possibility of

Brazilian Journals of Business

systemic errors, i.e. there is a failure to assess the risk of a selected alternative, and may also restrict the critical thinking of the group members, such that the easiest options are the preferred.

When the data obtained by the gender of the candidates is explored, there was a difference in the results, with proposition 1 being more accepted when held by a female candidate, supporting the assumption that information from the females are better accepted when they are optimistic (CARLI, 200; RUDMAN & GLICK, 2001) about a certain situation. Nevertheless, when the results of the choices with males candidates are considered, there was a higher level of critical analysis between the groups, so this may point out that voters analyzed more rationally the economic scenarios and the propositions.

However, when considering only the behavior of the groups in the experiment, when there was the opportunity of questioning the candidates (procedure 3) not all groups questioned the candidates, running counter to the Theory of Rational Decisions which maintains that the decision makers will always look for relevant information before deciding for something (REDLAWSK & LAU, 2012). The fact that this ability for group questioning in an experiment went unutilized indicates that the agents do not always seek to better understand the subject or seek answers to some questions before making a decision.

Due to the foregoing, even if the sample of participants were higher than estimated initially, at 300 students, acquiring a more informed development of data would require a longer time for analysis and further carrying out the experiments, as the sessions were held in about a month, with different volunteering candidates. A longer period of time and planning is required for a higher concentration of the sample and analysis of the results, such as the need for greater uniformity of candidates, and even though the candidates were for the economy graduate course, they were also from different academic levels.

It should be noted that for suggestions for further work, research with students from different undergraduate courses would be interesting, not eschewing only courses that can have an analysis through its disciplines of economic indicators. It would be interesting to perform a study with sciences and technology courses. Furthermore, looking outside of the academic institutional context, it would be possible to carry out the experiments with people of a lower education level and check for variation in results. Another possibility would be an analysis with high school students, using the sessions for economic discussions by teachers. Due to the experiments made, it was observed that some of the concepts were seen by participants only in college and in high school and that the studying of these concepts were fundamental to the basis of creating a critical position of decision maker agents.

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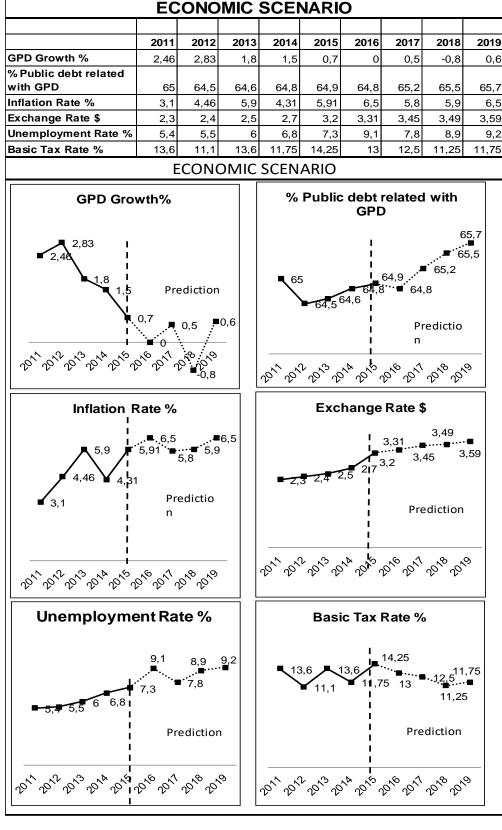
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1 Appendix A **Figure 1.**

Economic Scenario

ECONOMIC SCENARIO

	2011	2012	2013	2014	2015	2016	2017	2018	2019
GPD Growth %	2,46	2,83	1,8	1,5	0,7	0	0,5	-0,8	0,6
% Public debt related with GPD	65	64,5	64,6	64,8	64,9	64,8	65,2	65,5	65,7
Inflation Rate %	3,1	4,46	5,9	4,31	5,91	6,5	5,8	5,9	6,5
Exchange Rate $	2,3	2,4	2,5	2,7	3,2	3,31	3,45	3,49	3,59
Unemployment Rate %	5,4	5,5	6	6,8	7,3	9,1	7,8	8,9	9,2
Basic Tax Rate %	13,6	11,1	13,6	11,75	14,25	13	12,5	11,25	11,75

ECONOMIC SCENARIO

Source: Elaborated by the author.

Brazilian Journals of Business

1 Appendix B

Table 7. Experiments Conducted

N°	Date	Class	Dura_min	Proce	Gen	Prop 1	Prop 2	Sample	n Pa1	perc_part1	n Pa2	perc_part2	Null	(%) Null
1*	03/09/2015	Microeconomics II	20	P3	M	Ca	Cb	12	3	**25,000**	9	**75,000**	0	**0,000**
2	14/09/2015	Market economy	15	P1	M	Ca	Cb	36	2	**5,556**	34	**94,444**	0	**0,000**
3**	15/09/2015	Financial Management	10	P1	M	Cb	Ca	3	2	**66,667**	1	**33,333**	0	**0,000**
4	15/09/2015	History of Economic Thinking	20	P3	M	Cb	Ca	23	12	**52,174**	11	**47,826**	0	**0,000**
5	16/09/2015	Process management	20	P1	F	Ca	Cb	36	24	**66,667**	12	**33,333**	0	**0,000**
6	17/09/2015	Technical Research in Economics	12	P2	F	Cb	Ca	9	7	**77,778**	2	**22,222**	0	**0,000**
7	17/09/2015	Research Tools in Economics	15	P2	F	Cb	Ca	17	8	**47,059**	7	**41,176**	2	**11,765**
8	23/09/2015	Social accounting	15	P3	F	Ca	Cb	17	9	**52,941**	8	**47,059**	0	**0,000**
9	23/09/2015	Economic Scenario Analysis	19	P2	F	Ca	Cb	30	9	**30,000**	21	**70,000**	0	**0,000**
10	28/09/2015	Economic Scenario Analysis	20	P2	F	Cb	Ca	42	28	**66,667**	14	**33,333**	0	**0,000**
11	01/10/2015	Statistics	16	P2	F	Cb	Ca	21	5	**23,810**	16	**76,190**	0	**0,000**

Continuation

12	05/10/2015	Economy II	20	P3	M	Cb	Ca	28	8	28,571	20	71,429	0	0,000
13	06/10/2015	Accounting I	15	P1	M	Cb	Ca	19	10	52,632	9	47,368	0	0,000
14	06/10/2015	Administrative Process Fundamentals	25	P3	M	Cb	Ca	29	2	6,897	27	93,103	0	0,000
15	06/10/2015	Process management	25	P3	M	Cb	Ca	38	18	47,368	20	52,632	0	0,000
16	07/10/2015	International accounting	12	P1	F	Ca	Cb	15	4	26,667	11	73,333	0	0,000
17	07/10/2015	Applied statistics	15	P1	F	Ca	Cb	25	17	68,000	7	28,000	1	4,000
18	07/10/2015	Administrative Process Fundamentals	15	P1	F	Cb	Ca	20	7	35,000	12	60,000	1	5,000
19	09/10/2015	Costs and budget in decision-making	12	P2	F	Cb	Ca	10	5	50,000	5	50,000	0	0,000
20	09/10/2015	Economic Statistics	15	P2	F	Cb	Ca	11	9	81,818	2	18,182	0	0,000
21	09/10/2015	Asset Portfolio Management	12	P1	F	Cb	Ca	5	2	40,000	3	60,000	0	0,000

Source: Elaborated by the author.