

Отже, піклування про безпеку теперішніх та майбутніх поколінь вимагає, щоб ці питання були закріплені в універсальному нормативному акті – Екологічній Конституції Землі. У цій Конституції бажано сформулювати розділ, присвячений регулюванню здійснення екологічно небезпечної діяльності, в якому має віднайти своє місце визначення поняття екологічно небезпечної діяльності, її видів, механізм забезпечення екологічної безпеки у кожній екологічно небезпечній сфері, який буде ефективним і для сфери транспорту.

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*М.С. Нижник, д-р філософії – Макаулаї Інститут,
Абердін, Шотландія*

МОДЕЛЮВАННЯ ОБМЕЖЕНОЇ РАЦІОНАЛЬНОСТІ У ПРИЙНЯТТІ РІШЕНЬ

Висвітлено труднощі, з якими стикаються економісти-теоретики у намаганні розширити сферу своїх досліджень в бік обмеженої раціональності. Метою є зробити наголос на процесі моделювання та зосередитись на побудові моделей, в яких центральне місце посідають процедурні аспекти процесу прийняття рішень. Такого роду моделі можуть стати корисним інструментом пояснення економічних та інституційних процесів. Згідно з Кенетом Арроу (1987), "немає жодного загального принципу, який передуює створенню економічної теорії, побудованої на гіпотезі, окрім принципу раціональності". Ідеєю цієї роботи є довести, що жорстка раціональність насправді виступає обмеженням для дослідника. Відхід від парадигми раціональної людини означає усунення такого обмеження і таким чином пропонує новий виклик та можливість для економістів, які працюють над концепцією обмеженої раціональності.

Ключові слова: процес прийняття рішень, обмежена раціональність, поведінка, моделювання.

*Maria Nijnik¹ – Socio-Economic Group, the Macaulay Land Use Research
Institute, Craigiebuckler, Aberdeen, Scotland*

Modelling bounded rationality in decision-making

This paper discusses the dilemmas faced by economic theorists attempting to expand the scope of their research in the direction of bounded rationality. The objective is to emphasize the modelling process and focus on the construction of models in which procedural aspects of a decision-making process are regarded to be the most important. Such models can become useful tools in providing explanations of economic and institutional processes. According to Kenneth Arrow (1987), "there is no general principle that prevents the creation of an economic theory based on other hypothesis than that of rationality". The idea of this paper is to argue that substantive rationality is actually a constraint on the modeller. The departure from the rational man paradigm represents an elimination of the existing constraint and therefore a challenge and an opportunity for economists dealing with the concept of bounded rationality.

Keywords: decision-making, optimization, bounded rationality, behaviour, modelling.

Introduction

There were certain attempts in the past to model bounded rationality and replace the basic concept of a rational man and of a fully rational microeconomic behaviour with alternative decision models, like those proposed by Herbert Simon in the mid-1950 s. However, despite the worldwide recognition of the Simon's work, not much has been achieved in this area until recently. Methodological aspects of the construction of new models, i.e. based on the hypotheses other than those of rationality, were presented in the works of Hogarth Reder (1987), Arrow (1987), Tversky and Kahneman (1986) et al. The problem was also addressed by Selten (1989) who proposed an alternative view, i.e. that of bounded rationality, and by Lipman (1995) who made a brief survey of the topics under discussion. Taking these ideas and those of Ariel Rubinstein (1997), as a starting point, this paper analyses models in which policy actors deliberate decisions by applying the procedures that guide their reasoning about "what to do" and "how" to decide. We provide general overview of bounded rationality, discuss its modelling in decision making processes, address imperfect recall and modelling of bounded rationality in games.

Bounded rationality

The concepts of rationality and optimization strongly affect the behaviour of agents and thus the outcomes of the decision procedures.

- But what is a rational man paradigm?
- What can we get from the achievements of psychology of what to model (models of choice and interaction)?
- What are the main directions for the "attack on the traditional approach"?

The concepts of rationality and optimization imply that rational agents can not agree or disagree, and when the bet is 'common knowledge' they simply can not bet and any speculation is banished. In this respect the question arises: 'How much irrationality must be permitted before speculation and agreements to disagree emerge in equilibrium?' Geanakoplos (1989) has established necessary and sufficient conditions for the information processing errors captured by non-partitional possibility correspondences to allow for speculation, betting and agreeing to disag-

¹ AB15 8QH, the United Kingdom, tel.: +44 (0)1224 498200, fax: +44 (0)1224 311556. E-mail: m.nijnik@macaulay.ac.uk

ree. He showed a certain hierarchy where agents can be a little irrational and still not speculate, agree to bet, or agree to disagree. If they are a little more irrational, they will speculate, but not agree to bet or agree to disagree. If they get a still more irrational behaviour, they will speculate and agree to bet, but not agree to disagree about the probability of an event. Finally, if they are still more irrational, they will speculate, agree to bet, and agree to disagree.

According to the economic theory, *rational decision maker* is an agent who has to choose an option after answering the questions:

- What is feasible?
- What is desirable?
- What is the best alternative according to the notion of desirability, given the feasibility constraints? (Rubinstein, 1997, p. 7).

Rational man is a decision maker that takes the action, after some courses of regulation, i.e. the definition of what is feasible and what is desirable, which are independent from each other. Further calculations with finding out an optimal alternative complete the procedure.

A *key assumption* regarding the decision making is that the operation of defining feasible alternatives and choosing preferences are completely independent. The scheme of the choice procedure of a rational decision maker is to choose an element x^* in a set A , that $x^* = x$ for all $x \in A$. The following assumptions are taken as granted:

- Knowledge, i.e. a decision maker is fully aware of the set of alternatives;
- Clear preferences, i.e. he has a complete ordering over the set of alternatives;
- Ability to optimize that is unlimited and correct;
- Indifference to logically equivalent descriptions of the alternatives and choice sets, which implies that if the sets A and B are equal, then the choice from A is the same as the choice from B .

The so-called "*traditional economist's position*" is explained by the fact that the main interest of economics lies in the behaviour of a decision maker and not in the process of decision making. Even in cases when the actor does not follow the rational man procedure, his behaviour can be described as if he follows this procedure. Decision maker's behaviour function satisfies the consistency condition, and the choice functions that satisfy the condition, even if they are not derived from a rational man procedure, can be described as if they are derived by a rational man (Rubinstein, 1997, p. 12).

However, the evidence from *psychological experiments* and from real life shows that in reality there exist common procedural actions that are different from the elements of those of rational man's decision-making procedure. For instance, if the ordering by which the alternatives are examined is dependent on the set, a discrepancy with the consistency condition arises. Elements of procedure fit in systematic phenomena of our reasoning. In life choices are taken from a list, not a set. In reality, for instance, we pay attention on something not common and then we choose from that, but not from what is repeated more often. Our choice may be influenced by the alternatives. Such motives, as "framing effects", "the tendency to simplification" and "search for reasons" usually appear in real life situations and *conflict with the rational man paradigm*.

Framing effects demonstrate that in our decision making, the procedure of choosing is very sensitive to the description of choices. This could be explained as following. In real life, under the circumstances that the set could be described by various ways, equivalent alternatives are not always treated equally. This poses challenges to the rational man paradigm and leads to the idea that the alternatives have to be verbally described in the model. Procedure impacts the decision taking.

The **tendency to simplify decision problems** is a method of saving deliberation resources. A decision maker does not consider all the elements in A but only those that are selected by a predetermined rule. The choice then does not satisfy a consistency condition. The **search for reasons** means that choices are often made on the basis of reasons. If they are independent from the choice problem, the fact that the decision maker is motivated by them does not conflict with rationality. However, the reasons might be the so-called "internal" and dependent on the decision problem (for instance, the preference of one alternative over another is determined by the other elements in the set) and then a contradiction with the rational man paradigm appears. The procedure often does not satisfy the consistency condition.

However, the statement that the behaviour is not rational does not mean that it is chaotic. Simon (1976) defined the notions of **substantive and procedural rationality**. Substantive rationality refers to the behaviour that is appropriate to the achievements of given goals within the limits imposed by given conditions and constraints. Behaviour is procedurally rational when it is the outcome of appropriate deliberation, of a certain strategy of reasoning, thus not an outcome of impulsive responses without an adequate intervention of thought, as is it with irrational behaviour (Simon, 1976).

In the context of "bounded rationality", the following research questions therefore come up:

- What are the relations between different kinds of reasoning procedures?
- To what extent are standard economic models sensitive to the existence of elements of bounded rationality?
- Do procedural elements explain the existence of economic institutions?

Modelling bounded rationality in decision making

This section focuses on **modelling procedural decision making**. The aim is to discuss how to model formally procedures of choice that exhibit a certain procedural element, and then to investigate whether or not such procedures are compatible with the rational man paradigm. Preference relations which are consistent with the procedure and the restrictions on the space of preferences are identified by analyzing experimental examples.

Preparation of the tools for further investigation includes definition and explanation of the **similarity relations** which are taken to be a binary relation on the set $I=[0,1]$ that satisfies the following **properties** (Rubinstein, 1997):

- (S1) Reflexivity: For all $a \in I$, $a \sim a$.
- (S2) Symmetry: For all a & $b \in I$, if $a \sim b$, then $b \sim a$.
- (S3) Continuity: The graph of the relation $\sim$ is closed in $I \times I$.
- (S4) Betweenness: If $a = b = c = d$ and $a \sim d$, then $b \sim c$.
- (S5) Nondegeneracy $0 \sim 1$, and for all $0 < a < 1$, there are b and c , so that $b < a < c$ and $a \sim b$ and $a \sim c$. For $a=1$, there is $b < a$ so that $a \sim b$.

(S6) Responsiveness Denote by a^* and $a_{\#}$ the largest and the smallest elements in the set that are similar to a . Then, a^* and $a_{\#}$ are strictly increasing functions (in a) at any point at which they obtain a value different from 0 or 1.

When the choice is made, for instance, from a set of pairs of lotteries $L_1 = (x_1, p_1)$ and $L_2 = (x_2, p_2)$, the following *steps of decision procedure* are applied:

Step 1 – Check dominations: If both $x_i > x_j$ and $p_i > p_j$, then choose L_i ;

Step 2 – Check similarities: If $p_i \sim_p p_j$ and not $x_i \sim_x x_j$, and $x_i > x_j$, then choose L_i .

If $x_i \sim_x x_j$ and not $p_i \sim_p p_j$, and $p_i > p_j$, then choose L_j

If the first step is not decisive, we move to the second step. If the second step, in which the similarity relations are invoked is also not decisive, then we move to the third step which however is not specified.

- Analysis of the decision procedures includes the following *questions*:
- Are the steps 1 and 2 of the procedure consistent with the optimization of any preference relation?
- How is the set of preferences that are consistent with the procedure restricted?

After a broad explanation of the logic of the procedure and presentation of the proofs of the propositions which provide the answers to the questions, the conclusion was made that (P-*) does not necessarily conflict with the rational man paradigm. The assumption that a decision maker uses a procedure with a pair of similarity relations narrows down the consistent preferences to almost a unique preference whose maximization explains the decision maker's behaviour. Steps 1 and 2 "over determine" the preference and according to Rubinstein (2005), even before specifying the content of Step 3, we arrive at almost a unique preference that is consistent with the choices determined by applying only Steps 1 and 2.

Imperfect recall

The discussion of modelling limited memory requires presentation of some of the major differences between a decision problem with perfect and imperfect recall (Rubinstein, 1997 and 2005; Rubinstein and Piccione, 1995). The distinction between perfect and imperfect recall with the formalization of extensive games follows the ideas of Kuhn (1953).

Knowledge and interactive knowledge are central elements in economic theory. People usually act on the basis of incomplete information. If they are rational they recognize their own ignorance and reflect carefully on what they know and what they do not know, before choosing how to act. Furthermore, when rational agents interact, they think about what the others know and do not know, and what the others know about what they know, before choosing how to act (Geanakoplos, 1992). Usually when economists use the term "rationality", they require that the action is the best possible given the decision maker's knowledge, and also that the knowledge is derived from the coherent inferences. Models with bounded rationality are intended to allow us to talk about agents who systematically do not make correct inferences (Rubinstein, 1997).

Imperfect recall is defined as a particular case of imperfection of knowledge that lies at the heart of human processing of information (appendix, example 1). When an individual decision maker acts in several steps, having certain memory li-

mits, or when it is a group of agents that has communication problems between the individuals, we have examples of imperfect recall. In a decision problem with perfect recall the decision maker "remembers" the actions taken in the past and the information he obtained about chance moves. With imperfect recall it is not the case. In that case the decision maker perceives some valuable information that might be useful later, but he will not perceive this information at a later stage. The basic properties that hold for decision problems with perfect recall, fail to hold with imperfect recall.

The most commonly used framework for analyzing the decision making procedure with imperfect recall is the model of an extensive decision problem, a conventional extensive game with one player. Several examples of imperfect recall were presented and explained by Rubinstein (1997), and e.g. the decision problem exhibiting the so-called "*absent-mindedness*" was perfectly explained on the example with a driver, where the decision problem has an information set, containing both a history h and a sub-history of h .

Rubinstein (1997) presented a notion of a pure *strategy* and turned to its different notions. He stressed that in game theory there often exist two extensions of the notion of a strategy, each of which uses random factors: a behavioural strategy and a mixed strategy. A behavioural strategy is defined as a rule of behaviour that assigns (possibly random) behaviours to each of the information sets in the decision problem. The behavioural strategy is optimal, if no other behavioural strategy yields a higher expected utility.

The definition of *optimality* refers to considerations arising before the decision problem is initiated, when a decision maker develops a plan of what should be done in each of the possible scenarios (Rubinstein, 2005). The question arises: what if the decision maker does not make his decisions in advance or what if he makes his decision in advance, but the decision is – "not to decide" and "to postpone decisions to the later stage"? Such questions are usually not taken into consideration when analysing conventional decision problems with perfect recall. While analysing the decision problems with imperfect recall the mentioned above problems can not be considered as insignificant any longer. Interpretations that are inconsequential under perfect recall have got important implications in the analysis of games with imperfect recall.

The most commonly used framework for analyzing the decision making procedure with imperfect recall is the model of an extensive decision problem, a conventional extensive game with a single player. In extensive decision problems with imperfect recall games with a single player, care must be taken in interpreting information sets and strategies which are the main elements of the model. The distinction between perfect and imperfect recall for extensive games was introduced by Kuhn (1953). Since then, traditional game theory has excluded games with imperfect recall from its scope. Rubinstein has readdressed this topic and developed it further. He worked out the issues: consistent beliefs and time consistency of optimal plans; randomization at information sets and the multi-selves approach to decision making.

Following Rubinstein, a strategy is *time-consistent* "if at no information set reached as the decision problem unfolds does reassessing the strategy for the remainder of the decision problem lead to a change in the plan of action" (Rubinstein,

1997, p.72). Concerning the decision problems with perfect recall, a strategy is optimal if it is time-consistent. However, with imperfect recall there are problems for which time consistency and optimality are not identical properties. For instance, the strategy may be time-consistent but not optimal and the optimal strategy may be not time-consistent (appendix, example 2). Regarding decision problems with absent-mindedness, the inconsistency problem arises without changes in information of preferences during the execution of the plan, as it usually happens, and the consistency problem is more severe in this case.

Time inconsistency in this case is not a usual example of this concept (Rubinstein, 1997). Usually, it arises as a result of changes either in preferences or in information during the execution of the plan. In the example with an absent-minded driver (appendix, example 3) preferences over the final outcome are constant and the only changing factor is the occurrence of the situation. The example exhibits a conflict between two ways of reasoning. The first is based on a quite minimal principle of rationality: having chosen an optimal strategy, one does not have to verify its optimality at the time of execution unless there is a change in information or preferences. The second way of reasoning is based on the principle which calls at each instance to maximize expected payoffs given the relevant beliefs.

The role of *randomization* is also worth to be discussed. In standard decision theory a decision maker applies a strategy without random devices. Even if a decision maker uses a random device to determine his action, with perfect recall he would not be able to obtain an expected payoff to be higher than that without randomization. It was shown that if the decision maker is an expected utility maximizer, a mixed strategy cannot induce a payoff strictly higher than at a pure strategy, and it was proven (Isbell, 1957) that for any decision problem without absent-mindedness, no behavioural strategy could be strictly better than a pure one. To conclude, a decision maker considers the use of random devices to be crucial only while analysing the decision problems with absent-mindedness.

One more question which is important while analysing problems with imperfect recall is the following 'is a decision maker at one history able to control his actions at another history, or not?' The equivalence of the so-called single-self and *multi-selves approaches* for decision problems with perfect recall breaks down when we analyse decision problems with imperfect recall. With the problems with absent-mindedness the situations are more complicated. If a decision maker can not control his behaviour beyond the instance in which he operates, the situation appears to be a multiplayer game. However, in general, it is important to keep the definition of a single player to be an entity that considers its present and future actions to be under control at any one time, but assumes that it does not affect the actions taken by the other players (Rubinstein, 1997).

The question of the *memory of a strategy* is also important. When analysing time consistency, it is predetermined that player's beliefs are consistent with the strategy and that an actor remembers the changes he makes. The model is "silent" whether the decision maker can remember the chosen strategy and is able to recall a change in strategy, in case he makes this change. Another aspect that narrows down the model could arise from the fear of the decision maker on the

confusion that motivates him to prefer simplified models to avoid the harm resulting from his doubt on the information he possesses. Modelling confusion and its effectiveness within an extensive decision problem model remains problematic.

Modelling bounded rationality in games

In standard games each player behaves according to the rational man paradigm, although in real life it is not always the case. Considering the incorporation of procedural rationality considerations into models of interactive situations, in games, Rubinstein (2005) discusses the models of interaction in which a player follows a decision procedure which is not consistent with the rational man paradigm.

There may be different interpretations of the solutions regarding the *models of interactive situations*. A player could be an actor that operates in the conditions that are determined by the behaviours of other agents which are known to the player. He then takes their behaviours as inputs to his decision making. Another case could be if a player is not aware of other players' strategies. Under these circumstances he will take into account the other players' behaviours according to the model's primitives (preferences and the informational structures). Such two different interpretations of equilibrium do exist due to the theoretical assumptions of bounded rationality that was put into the model.

An interaction when players have decision-making procedures, the primitives of which include the players' preferences different from those of a rational man is discussed in Rubinstein (1997), where games with procedurally rational players are addressed. The version of such games could be explained, as follows. A decision maker has to choose from a set of actions A with uncertain outcomes in a set C . For this purpose he develops a deterministic action-consequence relationship and undertakes the action with the best attached outcome. Then the chance that a certain consequence $c \in C$ will be attached to $a \in A$ is taken to be the frequency with which c is observed with a . Therefore, the random action-consequence relationship results in random behaviour (Rubinstein, 1997, p. 124).

An example demonstrating these theoretical considerations is given below. Consider a symmetric two-player game (A, u) , in which a player has to choose an action from a set A . His payoff, if he chooses the option $x \in A$, and his opponent takes the action $y \in A$, is $u(x, y)$. A candidate for the solution then is a mixed strategy α^* (a lottery on A). Given α^* for each $x \in A$, let $L(x, \alpha^*)$ be the lottery that induces the consequence $u(x, y)$ with the probability $\alpha^*(y)$. Our equilibrium requirement is, that for all $\alpha \in A$, the number $\alpha^*(\alpha)$ is the probability that the action α gets the highest value from among all independent realizations of $\{L(x, \alpha^*)\}_{x \in A}$, breaking ties evenly among all actions that yield the maximal payoff.

In this version of a game model, a player does not start by constructing a conjecture on the action of his opponent, as does the rational player in a standard game theory. In our case the player links each of his options to the results, an action to a consequence. Doing this the player does not take into account any strategic considerations of the other players. The *equilibrium notion* in this case requires the complete specification of each player's ranking of all the outcomes, while the standard notion of a pure Nash equilibrium requires that the player rank the outcomes exclusively for the

fixed opponent's action. It was shown that for finite games the existence of equilibrium is guaranteed. In the symmetric games with more than two actions, the so-called dominated action could appear in equilibrium with positive probability.

Concerning bounded rationality, *limited foresights in extensive games* are among the most interesting modelling issues. This means the case with modelling players who have limited ability to understand the extensive game they are confronted with. Playing chess is a good illustration of such a game, although modelling "chess-like" behaviour in games still remains difficult. In general, there exist two approaches that capture the limited foresight reasoning. The first one is when a player treats his future behaviour as given, although he can influence it. The second approach is when he treats the plans of his opponents, though he is not aware of his own moves. The ideas around limited foresight reasoning are based on the ideas of Rubinstein and Wolinsky (1990).

Conclusions

The critics of the rational man paradigm have emerged from a comparison of the assumptions made by economic modellers about perfect rationality with the observations of scientists about human behaviour. This dissatisfaction with the models that adhere to the rational man paradigm was a basic motivation for developing of models of bounded rationality. Bounded rationality models are based on the examples from real life and can help us in clarifying a lot of complicated and problematic questions. With the concept of bounded rationality, an objective of economic theory has become to deduce interesting relationships between different ideas that appear in our reasoning on interactive situations. These relationships explained by models are meant to establish "linkages" between the concepts and statements that appear in our daily thinking.

Currently, the key objectives of economic and behavioural sciences are to construct models useful for providing of explanations of economic (or other, e.g. institutional) phenomena which could not otherwise be explained. Several examples of institutions which should be properly explained are, as follows (Rubinstein, 1997):

- Advertising, that is an activity which is supposed to influence economics agents' decisions not only by supplying information and changing preferences, but also by influencing the way the decisions are taken.
- Capabilities of decision makers are different. They are not equally capable of analysing the situation even when the information is the same for every agent. Thus their economic success is different.
- Many social institutions (e.g. standard contracts and legal procedures) that exist to simplify decision making processes.

The ideas, views and knowledge on bounded rationality are evolving. Procedural aspects and philosophical issues of decision making processes have been raised (Rubinstein, 1997) and are challenging and promising for being developed further on, and especially concerning:

- Construction of pertinent new theories of choice responded to the data from psychological experiments.
- Refinement of the notion of choice (how to decide and collect information, what procedure to use etc.).

- Transformation of the notion of equilibrium (with respect to the environment in which decision makers operate, concerning their ability to analyze the situation etc.).
- Broadening empirical evidence in support of the notions of bounded rationality.

Acknowledgement:

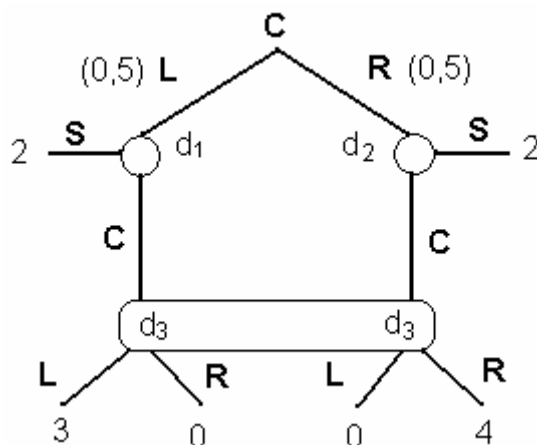
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Appendices

Source: Rubinstein (1997)

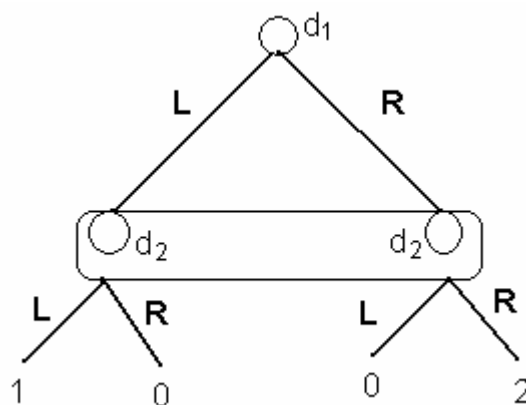
Example 1: The most common example with imperfect recall.

A decision maker has eight pure strategies and six plans of actions. A behavioural strategy is a triple of probabilities, one for each information set, and a mixed strategy is a lottery on the eight pure strategies. The decision maker perceives some valuable information at a certain stage. The information may be useful at a later stage, but the decision maker will not perceive this information later. Formally histories (L, C) and (R, C) are in d_3 , but $\exp(L, C) = (\emptyset, \{L\}, C)$ while $\exp(R, C) = (\emptyset, \{R\}, C)$. The unique optimal strategy is to choose S at d_1 and R at d_3 . It yields an expected value 3. However, on reaching d_1 the decision maker, if he is able to review his strategy, would prefer changing it to C at d_1 and L at d_3 . Thus the optimal strategy is not time-consistent.



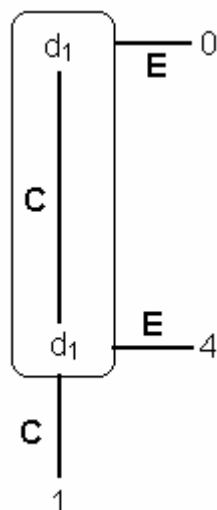
Example 2: Examining time consistency

The decision maker has to choose a password L or R then he has to repeat it in order to achieve a non-zero payoff. If he repeats L twice he gets 1, if he repeats R twice he gets 2. When the time comes to repeat the password, the decision maker knows that he has chosen a password but he does not recall whether it is L or R . Formally, the problem is with imperfect recall because $\exp(L) = (\emptyset, L)$? $\exp(R) = (\emptyset, R)$. When using the mixed strategy, the decision maker does remember the outcome of the random factor, which determines whether he is playing 'twice L ' or 'twice R '. On the other hand, if at d_1 he employs a behavioural strategy, in which chooses L or R with some probabilities, he is not able to recall the outcome of his randomization at d_1 once he reaches d_2 . The model does not allow us to refer to restriction on the memory of the strategy. The strategy is time-consistent.



Example 3: Explaining the so-called absent-mindedness

This is a paradox of the absent minded driver exhibiting a conflict between the two types of reasoning. In this example, the decision maker does not distinguish between the first and the second nodes. Reaching the second nodes, he loses the information that he had previously made a choice. The decision maker is unable to distinguish between the two histories on the same path. Despite no new information and no change in his preferences, the decision maker would like to change his initial plan once he reaches an intersection. The optimal strategy is deeply not time-consistent.



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**УДК 338.57:551:341(075.8) Ст. наук. співроб. О.В. Садченко, д-р екон. наук;
проф. С.К. Харічков, д-р екон. наук; аспір. Н.В. Скорик – Інститут
проблем ринку та економіко-екологічних досліджень НАН України**

НАЦІОНАЛЬНІ ПРОГРАМИ ЗБЕРЕЖЕННЯ БІОРОЗМАЇТТЯ У ГЛОБАЛЬНОМУ ЕКОНОМІКО-ПРАВОВОМУ ПРОСТОРИ

Розглядається вплив глобалізації на природно-ресурсний потенціал України. Встановлено чотири основні причини зменшення біорозмаїття. В Екологічній Конституції Землі запропоновано передбачити розділи, пов'язані із проблемою збереження біорозмаїття. На міжнародному рівні повинні вирішуватися як політичні, соціальні, так і еколого-економічні проблеми. Під час прийняття рішень у різних сферах людської діяльності на національному та глобальному рівнях треба враховувати їхній вплив на навколишнє середовище та обґрунтовувати його економічно.

Ключові слова: національні програми, конвенції, збереження біорозмаїття, економіко-екологічне співробітництво, економіко-правовий простір, інтеграційні процеси, нормативно-правове забезпечення, Глобальний Форум з Біорозмаїття, міжнародне співробітництво.

*Senior research officer O.V. Sadchenko; prof. S.K. Kharichkov;
post-graduate N.V. Skoryk – The Institute of Market Problems
and Economic and Ecological Researches of the NAS of Ukraine*

National programs on conservation of biological diversity in global economic legislation space

In the paper we discuss the influence of globalization on natural resources potential of Ukraine. The four main reasons of reducing the biodiversity are investigated. In Ecological Constitution of the Earth it is necessary to foresee the chapters related with the biodiversity preservation problem. At the international level the political, social, and ecological-economic problems must to be solved. Decision making in different spheres of human activities at national and global levels must be grounded on assessment of ecological impacts and be economically argued.

Keywords: national program, convention, conservation of biodiversity, economic-ecological collaboration, economic and ecological law, integration processes, legal aspects and legislative background, Global Biodiversity Forum, international cooperation.