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GREATEST HAPPINESS PRINCIPLE IN A COMPLEX SYSTEM: MAXIMISATION VERSUS DRIVING FORCE

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ABSTRACT

From philosophical point of view, micro-founded economic theories depart from the principle of the pursuit of the greatest happiness. From mathematical point of view, micro-founded economic theories depart from the utility maximisation program. Though economists are aware of the serious limitations of the equilibrium analysis, they remain in that framework. We show that the maximisation principle, which implies the equilibrium hypothesis, is responsible for this impasse. We formalise the pursuit of the greatest happiness principle by the help of the driving force postulate: the volumes of activities depend on the expected wealth increase. In that case we can get rid of the equilibrium hypothesis and have new insights into economic theory. For example, in what extent standard economic results depend on the equilibrium hypothesis?

KEY WORDS

driving force, equilibrium hypothesis, utility maximisation

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INTRODUCTION

The omnipotence of general equilibrium theory got serious leak during the recent financial crisis. Most of the critics addressed to the general equilibrium theory draws attention to some important limitations of the general equilibrium theory. Nevertheless, most of these critics basically stay within the same equilibrium framework.

The starting point for this equilibrium framework was the mathematical formalisation of the generally accepted aim of human behaviour: the pursuit of greatest happiness. Unfortunately, this greatest happiness principle was formalised by the help of the maximisation postulate. Solving for optimum has sense only if all the possible choices and constraints are known. In other terms, finding optimal solutions from a given set of possibilities is equivalent with the hypothesis of equilibrium. No doubt, economic systems are fairly complex systems: when agents take decisions, they do not know all the possible contingencies. In other terms, economic systems are far from being equilibrium systems. Therefore, the mathematical tool of optimisation, which allowed for great advances in economic theory in the 19th and 20th century, seems to constitute now the major obstacle for the further development of a useful and coherent economic theory.

In this paper we show that the adoption of the 19th century's Newtonian tool is not necessary for the development of a general mathematical economic theory. The modern 20th century's tool of non-equilibrium thermodynamics allows us to avoid the unacceptable simplification of equilibrium. Naturally, the existence of general equilibrium still can be obtained as a special case.

To do so, in the first point we remember two basic axioms used in economic theories. In the second point, we consider the decisional problem of individuals in a way like standard economics in order to make an anchor for comparison. In the third point, we develop the new theoretical framework, which is not based on the maximisation principle, but on the idea of driving force. Finally, we briefly discuss the two frameworks.

PHENOMENOLOGICAL BACKGROUND: TWO AXIOMS

A possible method for modelling the functioning of economic systems is micro-founded when we start from the behaviour and interactions of individuals. This method, called methodological individualism, requires that we attribute intentional actions only for individuals [1].

Intentional actions are preceded by decisions. Decisions can be taken in several ways. The point is to make hypotheses on individual decisions, which are not corroborated by empirical evidence, i.e. the observed actions are in parallel with the prediction of the behavioural hypotheses on individuals. In this regard, M. Friedman's "as if" critique is generally not correctly interpreted [2]. In fact, Friedman does not argue against the testing of hypotheses. He argues against the burden of social sciences, when hypotheses are qualified contradictory to empirical evidence just because modellers want model agents to behave reasonably, that is to say conform to the modellers understanding. No one would qualify a behavioural hypothesis on a molecule unacceptable, because the modeller would behave in a different way if he were a molecule. With Friedman's billiard player example: the empirical evidence is that a good billiard player shoots with very few mistakes. But we cannot test how he does it. A lot of scientists would however be inclined to drop the hypothesis that billiard players solve trigonometric equations, because if they play, they do not solve equations. But the modeller's thoughts are not tests as in natural sciences.

The generally accepted rule for intentional decisions in economics is of no harm. It reaches back to the founding proponents of utilitarianism, Jeremy Bentham (1748-1832) and John

Stuart Mill (1806-1873) [3, 4]: the governing law of human actions would be the "pursuit of the greatest happiness". The reason why this governing law is of great success may be twofold. First, because the existence of happiness is of the same reality as the existence of a stone: everybody can feel it, though it cannot be observed directly as the stone. Second, because without further conceptualization the happiness is a vague notion, therefore the postulate of the pursuit of the greatest happiness cannot be tested.

That is to say, micro-founded economic theories formulate (explicitly or implicitly) the following axioms [5, 6]:

1) **Axiom:** the ultimate reason for any human decision is the pursuit of the greatest happiness.

   This axiom is supported by empirical evidence. In addition, the happiness hypothesis is reasonable for the modeller. The pursuit of happiness was identified with the maximisation of utility in modern economics. However, it is important to note that the utility maximisation conceptualisation is just one possible way to translate the pursuit of happiness principle in an exact operational form.

2) **Axiom**: the state of happiness is affected, among other factors, by the stocks of goods.

   Measurable goods to be taken into account for individual decisions have the common feature of being: useful (happiness change with the change in the quantity of stocks), quantifiable (measurable) and that balance equations can be set for their variations[1].

This hypothesis is also parallel to the empirical evidence and also reasonable from the modeller's point of view. Three important points are to be mentioned. First, standard economics considers a slight modification of this axiom: the variation of the state of happiness depends on the consumption of goods. Stocks are taken into account as the consumption of the "service d'approvisionnement" of a stock of good [7]. It is important to underline that consumption is flow variable. But the function that describes happiness is a state function that depends on stocks and stock-like variables. As we will see, the slight modification of standard economic theory has serious consequences. Second, the existence of the list of goods implies some institutional hypotheses. As an example, we can think of money. The allocation of goods for the overall economy describes the state of the economy at a point in time. The dynamics of the variation of individual allocations is given by the dynamic equations for the change of goods. Third, Lyubomirsky's empirical research show that property accounts for less than 10 % of individual happiness. In fact, psychogenetic factors are responsible for 50 %, voluntary actions account for 40 %, and other factors – economic goods included – explain just the remaining 10 % [8]. This empirical test has disastrous implications as to the optimisation tool of standard economics. Happiness is largely dependent on non quantifiable variables. Therefore, there is no sense to find an optimum on a limited set of quantifiable variables. In fact, the optimisation with the omission of one constraint may give worse results than a random choice. In summary, the use of optimisation as a general tool is just a burden for economic science as already underlined by many economists, e.g. [9].

After these remarks, let us follow the economic tradition and denote the list of stocks by the vector X. The second axiom implies that we can write balance equations for the variation of an agent's stocks. The variation of the j-th stock of agent A is:

$$\mathrm{d}X_{\mathrm{j}}^{\mathrm{A}} = \sum_{k}\sum_{B} J_{\mathrm{j}}^{\mathrm{AB,k}} - D_{\mathrm{j}}^{\mathrm{A}} ,$$

where $J_{\mathrm{j}}^{\mathrm{AB,k}}$ stands for the volume of the j-th stock's change in agent A's relation of the k-th type with agent B. $D_{\mathrm{j}}^{\mathrm{A}}$ is a term for describing dissipation type variations. This dissipation term is generally neglected in economics, in spite of the fact that it is strictly positive by the force of the law of nature. Let us consider the Nature as a special agent (B = 0), and money as a special good (index j = 0 for money). Here are some possible *J* vectors if we have three goods:

$J^{AA,2} = (0, +2, -2)$ means that agent A can transform (produce) 2 units of the second into 2 units of the first good in the second type of stock change. The quantity of the 0th good – money – does not change. It is important to note that if symbolic goods are included into the list of goods (if the first good were nutritional stocks in the body) then the said transformation would describe consumption. That is to say, consumption could be considered as a special production.

$J^{AB,1} = (-1, +2, +1)$ the first type of stock change between agent A and B means that agent A spends 1 unit of money for 2 units of the first goods and one unit of the second good.

$J^{AB,2} = (-1, +2, +2)$ the second type of stock change between A and B means that agent A spends 1 unit of money for two units of the first good and two units of second good.

$J^{AB,3} = (-2, +4, +4)$ the third type of stock change between A and B means that agent A spends 2 units of money for four units of the first good and four units of the second good.

That is to say there are as many *J* vectors as possible portions of the commodities. With infinitely divisible goods naturally there would be an infinite number of possible stock changes. We note that these possible stock exchanges implicitly contain price ratios.

We note that in real time, an agent can make just one action at a time. Therefore, the type of stock change k identifies the agent B at the same time. Hence, the index B can be omitted.

DECISIONAL PROBLEM OF STANDARD ECONOMICS: THE MAXIMISATION PRINCIPLE

In order to avoid any misunderstanding, let us start from what we know. In the previous point, we have supposed that an agent pursuit the greatest happiness. We have also noted that this axiom was formalised by the utility maximisation program. That is to say, "happiness" was replaced with "utility" and "pursuit of greatest" with "greatest (maximisation)". With unlimited happiness in goods (no saturation point), this maximisation problem would have no solution. Therefore, a budget constraint is added to the maximisation problem. The budget constraint is a natural constraint in a market economy. It simply asserts that agents can purchase goods only in the extent of the value of goods they offer. This constraint can be weakened (include debt or money holdings). Even if we omit the interpretative problems that occur with these modifications ("money holdings" as well as "debts" cannot be considered as "money holdings" [10] and "debts" [11]), the constraint that determines the choice of the economic agent is fundamentally a financial constraint. As we will show later, there is no need for this artefact (individual choice is not exclusively constrained by financial constraints) in order to have a definite mathematical description of individual choice.

If prices expressed in monetary terms are denoted by *p* and there are j = 1, ..., *N* commodities (that is to say money is excluded), the decisional problem of an individual can be written as:

$$U^{A}\left(J_{1}^{A,k},\dots J_{N}^{A,k}\right)$$

$$\sum_{j} p_{j} J_{j}^{A,k} = M \quad J_{j}^{A,k} \geq 0$$

where *M* stands for the income (money) of the economic agent. Money in nominal terms does not generally enter into the utility function, because it would mean that with doubled money stock and doubled prices (that is to say the budget constraint remains the same) the economic agent would be better-off [2]. The utility function evaluates the *J* vectors without money:

$$J^{AB,1} = (-1, +2, +1) \rightarrow U^{A}(2, 1),$$

$$J^{AB,2} = (-1, +2, +2) \rightarrow U^{A}(2, 2),$$
$$J^{AB,3} = (-2, +4, +4) \rightarrow U^{A}(4, 4).$$

That is to say, standard economics formulates the decisional problem of the individual as a problem of choosing from a set of possible alternatives the best one. In order to make this decisional problem well defined, prices are to be taken as known variables. Furthermore, prices agents face must be uniform (the same good should have the same price in all exchanges). Otherwise we would not be in general equilibrium. (In the general equilibrium theory any planned exchanges can be executed. Hence, price differentials for the same good would allow for arbitrage, i.e.: gains just by making further exchanges.) In brief, without the uniform price taker agents we cannot find a general equilibrium solution.

However, the existence of the uniform price taker agent assumption is not harmless. It excludes the explicit introduction of any price adjustment mechanism into the model (we cannot have the empirical evidence of the law of demand and supply i.e.: prices change in the direction of excess demand as a result). Furthermore, it undermines the logical coherence of standard economic theory as a theory of market economies: the characteristic of a decentralised market economy is precisely that agents do not know when markets clear and they can make exchanges at disequilibrium prices [12].

The point is that if agents' decisional problems are defined with the maximisation principle, the uniform price assumption is also needed to find a general equilibrium solution. If a pair wise exchange mechanism is considered when agents are allowed to make exchanges also at disequilibrium prices, than we lose the results of the general equilibrium theory (no Pareto – efficiency with respect to the original initial endowments) [13] and the use of the maximisation principle loses its sense (supposed translation of the principle of the pursuit of the greatest happiness into mathematical language).

Therefore, it seems to us that the maximisation principle constitutes one of the major obstacles before the description of price formation in a decentralised market economy. In order to avoid this problem, we show another solution to the individual's decisional problem, which is also parallel to the pursuit of the greatest happiness principle.

DECISIONAL PROBLEM REVISITED: THE DRIVING FORCE PRINCIPLE

As we have seen, the standard representation of economic agents is the maximisation of utility under the budget constraints. Let us abandon this representation [14, 15]. For the sake of simplicity, let us consider just a very simple pure exchange economy and develop monetary exchange. We consider just one commodity and money and also suppose that differentials can be used. This is the most straightforward way to compare our representation with the standard decisional problem. The abandon of the standard representation of the economic agent means that we abandon the utility concept and the maximisation principle.

To abandon the utility concept means that we abandon the function, which relates the flows of commodities J to the variation of happiness. Instead, we consider that happiness can be given by a function $H(\ )$, which depends on the stocks of commodities X that an agent holds. As stocks determine just a small part of happiness, we will rather call it "subjective wealth" and denote it by Z. In brief, instead of $\mathrm{d}Z = U(J)$, we have $Z(X)$ as to the formalisation of the second axiom. If Z is a differentiable function, then the change of Z is defined by the change of stocks. Mathematically, for the change of wealth in our very simple setting we have:

$$\mathrm{d}Z^{A} = \frac{\partial Z^{A}}{\partial X^{A}}\mathrm{d}X^{A} + \frac{\partial Z^{A}}{\partial M^{A}}\mathrm{d}M^{A}.$$

It is logical to call the expression $\partial Z/\partial X$ the subjective value of commodity X, because the variation of X changes individual subjective wealth, i.e. it characterises the change of the subjective wealth.

We treat money as other commodities, that is to say money enters in nominal terms into the subjective wealth function. This means that money has also positive subjective value. For economists this assumption needs explication because of the utility concept, even if it seems a quite natural assumption from our daily life. As to economic arguments underlying this assumption let us recall the St. Petersburg's paradox. The paradox is a simple pile or face game: the first face pays as many dollars as the number of trials and the game stops if there is a pay-off. The expected value of this game is infinity, but people are willing to pay a very limited amount for such a game. The solution to this paradox proposed by Bernoulli is to enter the pay-off into the utility function, and to suppose a root square dependence between income and utility. In brief, the lesson from this paradox is that money enters into the evaluation function, thus it has subjective value.

From theoretical point of view, the hypothesis that money has positive subjective value implies that money also has positive value in exchange. A good part of standard monetary theorists take this hypothesis unacceptable: for them, the positive exchange value of money should be a result [16]. We join economists who consider the positive exchange value of money problem as a false problem. The reason is simple: we do not believe that the choice of a consumption bundle is at the same level as the choice of the transactions technique [17]. That is to say, an agent can independently choose a consumption bundle of other agents, as opposed to the transaction technique, where agents' choices are interdependent. In brief, the subjective value of money is not just a mathematical artefact.

The subjectivity of values naturally does not mean that values are arbitrary[3] and that values are constant. The subjective values attributed to the goods can be reappraised for two reasons: first, because of the success or failure of actions (this implies also expectations, which are always based on information and the agent understanding); secondly because of the change in the quantity of goods owned by the agent. In general, the subjective value of the good decreases with the increase of its quantity.

In our conceptualisation the subjective value is the wealth (happiness) increase due to the increase in the stock of the good. That is not observable. Nevertheless, relative values can be observed. In our money economies, the most convenient way to measure subjective values is a measure in terms of money. The subjective value in monetary terms of the commodity X is[4]

$$v = \frac{\partial Z/\partial X}{\partial Z/\partial M}\,.$$

The measure is straightforward: we offer for an individual the purchase of the commodity X at different prices. The individual will buy the commodity if it worth at least as much for him as the price he has to pay. The opposite is also true. If we observe the realised purchases of the same agent we can have an upper and a lower limit for the subjective values in monetary terms.

Finally, we note that there is still no consensus among economists how to define money. In general, money is defined with some functions that it performs. In the above representation we have just used the two generally accepted characteristics of money: stock variable and unit of account. We also emphasise for economists to whom money in nominal terms in the evaluation function is shocking that for us the evaluation function is not the utility function.

In summary, for the variation of the subjective wealth function we have the following expression:

$$\mathrm{d}Z^{\mathrm{A}} = \frac{\partial Z^{\mathrm{A}}}{\partial M^{\mathrm{A}}}\left(v^{\mathrm{A}}\mathrm{d}X^{\mathrm{A}} + \mathrm{d}M^{\mathrm{A}}\right).$$

If the price of commodity X is p ($p\mathrm{d}X_{\mathrm{A}} = -\mathrm{d}M_{\mathrm{A}}$), and if we utilise that $\mathrm{d}X_{\mathrm{A}} = J_{\mathrm{A}}$ in our simple case, then we finally have:

$$\mathrm{d}Z^{\mathrm{A}} = \frac{\partial Z^{\mathrm{A}}}{\partial M^{\mathrm{A}}}\left(v^{\mathrm{A}} - p\right)\mathrm{d}X^{\mathrm{A}} = \frac{\partial Z^{\mathrm{A}}}{\partial M^{\mathrm{A}}}\left(v^{\mathrm{A}} - p\right) J^{\mathrm{A}}.$$

If we kept the maximization rule, the solution of the above expression would have been the well known result of general equilibrium theory:

$$v^{\mathrm{A}}(J^{\mathrm{A}}) = p.$$

Nevertheless, let us abandon the maximisation rule as to the formalisation of the pursuit of the greatest happiness principle. As already mentioned, the maximisation rule implies that agents seek opportunities until equilibrium is reached. As all real processes need time, the abandon of the maximisation rule is equivalent to the abandon of the timeless (or infinite time) setting of the equilibrium framework (in addition, it is empirical evidence that no one will seek all the opportunities when shopping).

In brief, instead of the maximisation principle, let us assert that the volume of the transactions (J) depends on the unit gain of the subjective wealth in monetary terms ($v - p$). If we denote this function by $G(\ )$, we have:

$$J^{\mathrm{A}} = G^{\mathrm{A}}(v^{\mathrm{A}} - p).$$

In fact, $G(\ )$ may depend also on other variables and expectations. We note that standard economics considers a special form of this relation, the individual (net) demand curves.

As a further simplification, let us consider a linear approximation of this function:

$$J^{\mathrm{A}} = L^{\mathrm{A}} \cdot (v^{\mathrm{A}} - p).$$

where L represents the willingness of transaction. In fact, the willingness of transactions has the indexes (as prices): $L_{\mathrm{j}}^{\mathrm{AB}}$ where j stands for the commodity j and A and B for the agents involved in the transaction.

The above expression shows that the same expected gain implies different decisions (actions) as L^{A} changes. As an example, if agent B has already cheated agent A, than agent A can choose never to make exchanges with agent B, that is to say $L_{\mathrm{j}}^{\mathrm{AB}} = 0$. Or, agent A can choose to make exchanges just of the commodity j (for example the commodity j is not an experience good) but not of the commodity i.

It is straightforward to introduce any price determination mechanism. As an example, the determination of the price of commodity X in a bilateral exchange for two identical agents using the tautology that what agent A gives in the exchange agents B obtains and vica versa ($J_{\mathrm{j}}^{\mathrm{AB}} + J_{\mathrm{j}}^{\mathrm{BA}} = 0$), we have:

$$L(v^{\mathrm{A}} - p) + L(v^{\mathrm{B}} - p) = 0,$$

hence

$$p = (v^{\mathrm{A}} + v^{\mathrm{B}})/2.$$

At the end of this bilateral exchange, there is no guarantee that $v^{\mathrm{A}} = v^{\mathrm{B}}$. Therefore the two agents can make further exchanges until the two evaluations will be the same. Whether they do it or not, depends on the exact definition of the price formation mechanism.

If agents have different willingness of transactions L, then we have:

$$p = \frac{L^{\mathrm{A}}v^{\mathrm{A}} + L^{\mathrm{B}}v^{\mathrm{B}}}{L^{\mathrm{A}} + L^{\mathrm{B}}}.$$

The quantity exchanged is:

$$J^{\mathrm{A}} = \frac{L^{\mathrm{A}}L^{\mathrm{B}}}{L^{\mathrm{A}} + L^{\mathrm{B}}}\left(v^{\mathrm{A}} - v^{\mathrm{B}}\right).$$

General equilibrium theory considers the state when there is no further possibility of exchange. However, agent should make exchanges at the predetermined equilibrium price: it is clear that in that case for bilateral exchange (with several agents) the double coincidence of wants would not necessarily hold. The general equilibrium solution is then a special case: we should imagine that at the predetermined equilibrium price, agents make exchanges with a fictive agent of infinite stocks, but at the end of the realisation of all exchanges the stock change of the fictive agent is 0. This is the well known role of the Walrasian auctioneer in the general equilibrium theory. Put aside the condition of the zero stock change, the implicit assumption behind the Walrasian auctioneer is straightforward: the hypothesis of free exchanges at will at the given price is equivalent to the equilibrium assumption. If the special equilibrium price – when the stock changes of the Walrasian auctioneer is zero – would not be set as a further condition, the result of the general equilibrium theory would be a complete tautology.

It is well known that the general equilibrium solution is just one possible solution of the equilibrium market price problem. In fact, if agents are allowed to make exchanges at will (included disequilibrium prices), the equilibrium outcome of the exchange process will be different from the predetermined general equilibrium solution [13]. The driving force description of economic decisions contains explicitly this result: depending on the L parameters and on the way agents meet, the equilibrium outcome will also be different.

If we abandon the pure exchange setting, we can develop a general form for individual decisions. We mean by general form that the decisional problem is the same for each agent (consumer, producer) and for each economic action (exchange, production).

To do so, let us introduce unit bundles denoted by e. The unit bundle is indexed as $e^{\mathrm{AB,k}}$. This means that when the k-th type of stock change is considered in agent A and B's relation, the good flows are given by the vector $e^{\mathrm{AB,k}}$. As above, let us drop index B as the type of stock change in real time determines at the same time the other agent involved in the transaction. In that case, we can write for the variation of stock j in the k-th type of stock change:

$$J_{\mathrm{j}}^{\mathrm{A,k}} = e_{\mathrm{j}}^{\mathrm{A,k}}\, I^{\mathrm{A,k}}.$$

where $I^{\mathrm{A,k}}$ stands for the scalar of volume in the k-th type of stock change between agent A and agent B. The set of unit flow bundles e characterises the agents. With this notation, the variation of individual wealth (dissipation omitted) can be written as:

$$\mathrm{d}Z^{\mathrm{A}} = \sum_{\mathrm{k}} \mathrm{d}Z^{\mathrm{A,k}} = \sum_{\mathrm{j,k}} \frac{\partial Z^{\mathrm{A}}}{\partial X_{\mathrm{j}}^{\mathrm{A}}}\, \mathrm{d}X_{\mathrm{j}}^{\mathrm{A,k}} = \sum_{\mathrm{j,k}} \frac{\partial Z^{\mathrm{A}}}{\partial X_{\mathrm{j}}^{\mathrm{A}}}\, e_{\mathrm{j}}^{\mathrm{A,k}} I^{\mathrm{A,k}}$$

where j = 0 stands for money. The driving force principle states, if agents pursue the greatest happiness, the (subjective) wealth gain on the unit bundle and the volume of the activity cannot be independent. Let us denote the (subjective) wealth gain on the unit bundle of the k-th type of stock change by F^{k}, and the subjective wealth of the j-th stock for agent A, $\partial Z^{\mathrm{A}}/\partial X_{\mathrm{j}}^{\mathrm{A}}$, by $w_{\mathrm{j}}^{\mathrm{A}}$. That is to say:

$$F^{\mathrm{A,k}} = \sum_{\mathrm{j}} \frac{\partial Z^{\mathrm{A}}}{\partial X_{\mathrm{j}}^{\mathrm{A}}}\, e_{\mathrm{j}}^{\mathrm{A,k}} = \sum_{\mathrm{j}} w_{\mathrm{j}}^{\mathrm{A}} e_{\mathrm{j}}^{\mathrm{A,k}}\ ,$$

$$\mathrm{d}Z^{\mathrm{A}} = \sum_{\mathrm{k}} \mathrm{d}Z^{\mathrm{A,k}} = \sum_{\mathrm{k}} F^{\mathrm{A,k}} I^{\mathrm{A,k}}\ .$$

Following the driving force principle, F and I are not mutually independent:

$$I^{\mathrm{A,k}} = I^{\mathrm{A,k}}(F^{\mathrm{A,k}}) = I^{\mathrm{A,k}}(w^{\mathrm{A}}e^{\mathrm{A,k}})$$

Taking a metaphor from physics, $F^{\mathrm{A,k}}$ can be considered as the economic driving force between agents A and B in the k-th type of stock change. The economic driving force is hence the expected wealth increase on a unit bundle change in an economic activity. Using first order linear approximation of this relationship, we can finally write:

$$I^{\mathrm{A,k}} = L^{\mathrm{A,k}}\, F^{\mathrm{A,k}} = L^{\mathrm{A,k}} \sum_{\mathrm{j}} w_{\mathrm{j}}^{\mathrm{A}} e_{\mathrm{j}}^{\mathrm{A,k}}.$$

This formulation, with the help of the unit bundle, puts forward the fact that the choice is not directly on the flow vector of the variation of stocks J, but there is a double choice: the type of activity k and its volume I^{k} is selected.

In summary, the dynamics of the economic system can be characterised by the following equations (for j = 0, 1, ..., N goods and all the agents A, B, ...):

$$\frac{\mathrm{d}X_{\mathrm{j}}^{\mathrm{A}}}{\mathrm{d}t} = \sum_{\mathrm{k}} e_{\mathrm{j}}^{\mathrm{AB,k}} I_{\mathrm{j}}^{\mathrm{AB,k}} - D_{\mathrm{j}}^{\mathrm{A}} = \sum_{\mathrm{k}} e_{\mathrm{j}}^{\mathrm{AB,k}} w_{\mathrm{j}}^{\mathrm{A}} e_{\mathrm{j}}^{\mathrm{AB,k}} - D_{\mathrm{j}}^{\mathrm{A}}$$

under the condition:

$$I^{\mathrm{AB,k}} = I^{\mathrm{BA,k}}$$

As we can see, this is a non-linear differential system, because subjective values depend on stocks. Therefore, it is more complicated than the well-known Lotka-Volterra equation. The solution of nonlinear differential equations largely depends on the initial conditions (parameters). Therefore, the question whether these systems have equilibrium solutions and whether these equilibrium solutions are attractors, is not straightforward. It follows that the results of equilibrium economics have to be handled with care. Which results follow just from the equilibrium hypothesis and which ones can be considered as economic laws?

CONCLUSION

Standard economic theory has been dominating the economic thinking for decades. Though most of the economists are aware of the serious conceptual limitations of the standard framework, they still use it either because they state that "we do not have better" or because they (abusively) use M. Friedman's "as if" logic.

We have shown on the one hand that none of the above excuses are valid and on the other hand the reason why economists cannot get out of the trap of standard economic framework. In fact, the mathematical formulation of economic thoughts that made possible great advances in economic theory is that, which ties the hands of economists, Table 1.

Table 1. Brief comparison of two approaches in economics.

Postulates, consequences	Standard economics	Complex system's approach
Basic postulate for individual decisions	Pursuit of the greatest happiness	Pursuit of the greatest happiness
Working postulate for individual decisions	Maximisation of utility	Driving force of economic activities is subjective wealth increase
consequence 1	Maximisation → Equilibrium analysis	Driving force → No restriction
consequence 2	Utility → money has no subjective value	Subjective wealth → money has also subjective value

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[1]As an example, a certainly incomplete list of measurable stocks that affect our happiness includes: material goods (bread), money, time (labour), relational goods, physiological factors and knowledge. Time is a special source of happiness. It can be formally subsumed under the stock description because we make decisions how to use time and which type of activity to select. Relational goods capture the affective and communicative components of interpersonal relations. Physiological factors characterize the state of the body or bodily functions (fitness, appearance).

[2]Utility is the satisfaction of human needs from the consumption of goods. If the consumption bundle does not change, utility should also be the same.

[3]A little child who attributes high value to a little toy but no value to a $ 100 banknote is willing to make the exchange of the banknote for the toy but not vice versa. However, if she learns that she can get 10 toys for the banknote she will probably not exchange it just for one toy.

[4]This expression shows that money has no value in monetary terms. This assertion has already been formulated by Marx [18] in another context, when he stated that the general equivalent excludes itself from the realm of commodities.

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PRINCIP NAJVEĆE SREĆE U KOMPLEKSNOM SUSTAVU: MAKSIMIZIRANJE U USPOREDBI S POKRETAČKOM SILOM

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SAŽETAK

S filozofskog stajališta, ekonomske teorije utemeljene na mikro-razini odstupaju od principa teženja najvećoj sreći. S matematičkog stajališta, ekonomske teorije utemeljene na mikro-razini odstupaju od programa maksimiziranja korisnosti. Iako su ekonomisti svjesni ozbiljnih ograničenja ravnotežne analize i dalje ostaju u tom okviru. Pokazujemo kako je princip maksimiziranja, koji podrazumijeva hipotezu ravnoteže, odgovoran za to. Formaliziramo težnju za princip najveće sreće pomoću postulata pokretačke sile: opseg aktivnosti ovisi o očekivanom povećanju bogatstva. U tom slučaju uklanjamo hipotezu ravnoteže i dobivamo novi uvid u ekonomsku teoriju. Npr. o tome u kojoj mjeri standardni ekononmski rezultati ovise o hipotezi ravnoteži?

KLJUČNE RIJEČI

pokretačka sila, hipoteza ravnoteže, maksimiziranje korisnosti