Maximum Efficiency and Exchange: A New Interpretation in Economic Theory

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Abstract
The aim of the paper is the examination of relations between efficiency and exchange under different condition. A survey of different models is given and views of selected authors are examined (V. Pareto, J. Hicks, M. Allais, etc.) The author´s analysis shows, inter alia, that maximum efficiency can be reached in absolutely different ways at one and the same form of social life organization. But if different forms of economic system organization are considered, it is difficult to answer definitely which of them allows reaching maximum efficiency.

Key words: Surplus, efficiency, Wicksell-Lindahl balance, optimum conditions, maximum efficiency, Pareto efficiency, exchange between agents

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I. INTRODUCTION

Economic systems function with this or that efficiency. Theoretically, it is important to understand, what the greatest efficiency of this functioning could be, what it depends on and what factors can raise current efficiency. The question concerning increase is also not simple. It is quite probable, that it is not necessary to raise functioning efficiency. Socio- economic optimum is usually set by operating institutions. They are institutions that are the central unknown of the search problem of such optimum, but not the resources, income and their distribution. We will admit that economy develops in such a way, that it provides increase of agents' well-being standard. Is such increase effective? Does the maximum possible well-being for the given volume of resources correspond to maximum efficiency? [5]

II. MAXIMUM EFFICIENCY AND OPTIMALITY

Maximum efficiency can be considered to be the optimality condition of economic system. But how can this condition be achieved?
There are five conditions of optimality [2, c. 546-547]:
1. Optimality of exchange. The ratio of marginal utilities or quotas of replacement for each pair of blessings should be equal for all agents participating in exchanges; 2. Optimality of production. The ratio of marginal products and quotas of replacement for each pair of factors of production should be equal for all firms producing similar product; 3. Production structures. Under meeting first two conditions the prices of the production factor will be equal to marginal rate of substitution between consumed blessings; 4. Factors use. Total value of produced blessing should be impossible to increase for the account of remuneration of labour increase or employee transfer to a different kind of work; 5. Point of time. Marginal rate of substitution in time between each factor of production and a product, as well as between factors and products separately should be equal to the interest rate for non-risky securities.
The general criterion, which is based on five optimality points in the classical theory of well-being, says: subjective and objective marginal rate of substitution between any blessings should be equal for all agents of economic system, and subjective and objective proportions should be equal to each other. These conditions are considered to be necessary and sufficient for achievement of maximum well-being only under introduction of the principle of

decreasing factors return and J. Hicks's principle of "surpluses" extraction impossibility. In this sense, the well-being maximum corresponds to system's maximum efficiency. Though, it is obvious, that well-being maximization and, for example, maximization of national wealth are not the same from the positions of these conditions.

Maximum efficiency of some activity aspect - production, exchange, distribution - is not yet maximum efficiency of the system in whole, which consists of various activities. All these activities and, of course, their efficiency, are interconnected. Maximum efficiency is defined for the given available volume of resources. If this volume increases or decreases, that is, the amount of available resource changes, efficiency maximum also changes. Hence, each resource and consumer condition of economic system are characterized by its efficiency maximum. A new resource-consumer condition does not automatically mean reaching maximum efficiency for the same system, even if before this change the system has maximum efficiency under previous resource-consumer condition. When economic system does not use all the available resources at the moment, due to unemployment, idle capacities, or unused resources, may we consider such condition as a condition of maximum efficiency of the system, if used resources are exploited with maximum effectiveness? The fact is that maximum efficiency of economic system is in essence the greatest return of this system on any resource and action. Hence, at reaching such condition, there is no other condition of the system with greater return. Non-involvement of a resource in production does not mean loss of efficiency. Moreover, use of this "free" resource can additionally reduce the efficiency of economic system instead of its rise. Hence, at economy functioning inside the curve of manufacturing feasibility maximum efficiency is possible. Being on a curve the system can have lower efficiency as reserve availability, as well as the possibility to use it, is a blessings of high value. Being on a curve of manufacturing feasibility the system loses this blessing and must make a sacrifice.

Developing V. Pareto's ideas, Maurice Allais formulated fundamental equivalence theorems: any condition of maximum efficiency is at the same time a condition of markets economy balance, and any condition of markets economy balance is at the same time maximum efficiency condition [1, c.69]. He calls absence of any possible surplus a necessary and sufficient condition of maximum efficiency. It will be shown below, that pure competition as a market model and balance in this model shows such situation.

If we assume, that the condition of markets economy balance is incidental, or, that economic system is not in balance most of the time of its functioning, then the condition of maximum efficiency among probable variants will be maximum efficiency condition and it is not necessary for surplus to equal zero.

III. THE SURPLUS

Now we will pass to definition of what is understood as surplus and whether it is possible to use this idea as one of the estimation criteria of well-being standard. As is known, the concept of surplus in respect to a consumer and producer was developed by A. Marshall in his work "Principles of Economic Science". Wondering, how the price actually paid for the blessing reflects the benefit from possession of this blessing, he introduced the concept of consumer surplus. Consumer surplus is the difference between the price, which the buyer is ready to pay to possess this blessing and the actual price which he pays buying it. It is a measure of his additional satisfaction [3, c.191].

There will be a surplus of the consumer for each kind of blessing. This surplus will be defined by elasticity of the demand curve, market organization and the price fixed in the market.

Surplus of manufacturer can be introduced on the analogy. Only instead of the consumer blessing for the manufacturer there is a resource and the market of production factors where

the resources used for production of various blessings are sold and bought.
As it follows from the fair criticism of J. Hicks [5, c.134-135], money utility is not a constant and income and replacements effects must not be neglected while introducing the concept of consumer surplus and producer surplus. Moreover, the best interpretation of surplus is its identification with consumer benefit as a result of drop in the price of blessing, or with compensating change of income change the decrease of which compensated the drop in price. J. Hicks shows, that consumer surplus is necessary for the analysis of distributive effects and actually asserts, being oblivious, that commodity tax is a bigger burden for the consumer than income tax, but at introduction of income tax the consumer feels better while the state functions worse as well as consumption of public blessings created by the state. Thereby, I would like to demonstrate, that the concept of so-called theory of surplus with reference to the definition of system's effectiveness including the distributive one is, to put it mildly, inconvenient, if not inadequate. The reason is that consumer "surplus" is compensated by consumer "shortage" which is not taken into consideration for some unclear reason both in A. Marshall's analysis, and in the analysis of J. Hicks.
Let's show it with the following simple scheme (see Figure 1), reflecting acquisition and loss of surplus.

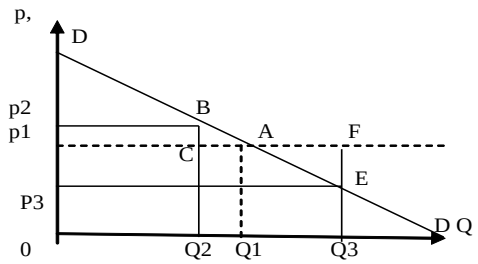

Figure 1. Diagram of Surplus Model

Let's admit that the curve of demand for blessing DD sets a certain market for this blessing. And consumers buy the amount of blessing Q1, which allows fixing price p1 in this market for the given period of time. Those agents who consume the amount of blessing less than Q1 should pay price p2 for the amount of consumption Q2 <Q1. However, price p1was fixed in the market and they will buy amount Q2 at the price p1<p2. Thus, interval BC according to A. Marshall means consumer surplus the value of which will be measured by the area of a right-angled figure p1p2BC for a certain consumer, and the area of triangle Ap1D for consumers of the given market. And if the demand curve represents the whole economic system, it will be consumer surplus of all consumers system. At least, it exactly follows from the known Marshall's and Hick's theories of consumer surplus. And here is also one important remark. The matter is that consumers, as well as producers, are heterogeneous, and they can be subdivided into those who consume less Q1, and those who consume more. Anyway, theoretically such decision inevitably comes to mind and is obvious. And the Figure also shows this fact. Then consuming Q3> Q1, consumers should pay the price p3 <p1, but actually they pay the price p1. Hence, surplus for one agent appears to be losses for others. Losses are measured by figure p3p1FE.
If the market was purely competitive and the demand curve was placed along the line AF, there would not be surplus. More than that, the more the demand inelasticity, the longer the interval BC will be, that is, surplus on the given graph (Figure 1). Hence, monopolism and power over the market provide surplus both to the consumer, and to the producer.
Certainly, the number of consumers in any market and in any economic system dynamically varies, and this change may be rapid enough. To estimate efficiency of the market or

economic system, it is necessary to find out what the proportion of consumers is. That is, what the ratio of the consumption groups is which are before and after Q1 for the given price p1 in a certain period of time. It can be so, that these groups are approximately equal and symmetric relative to Q1. Then the surplus will be completely compensated by the loss. Situations, when surplus on the whole is greater, or, on the contrary lower, are also possible. Hence, having defined the relation of the triangle ADp1 and triangle AFE, if Q3 is maximum volume of the blessing consumption, it is possible to find out the grand total for the given market.

The criterion of surplus can be applied to efficiency estimation of two agents exchange, but with regard to the effectiveness estimation of the system as a whole such application is inexpedient according to the given arguments. By the way, institutionally it is possible to prevent appropriation of consumer surplus by i^{th} consumer, having introduced prices schedules for the sold blessing (price lines), that is, having applied the principle of price differentiation. Thus the surplus will be appropriated by the producer.

Efficiency of the exchange of two agents or groups of agents is not yet full efficiency of these agents, to say nothing about maximum efficiency. And the condition of maximum efficiency of the exchange demanding maximum surplus yet does not guarantee agent's efficiency, or effectiveness of the system in which this agent functions.

If we consider some agent, what is the use to speak about his efficiency if he has died? Hence, understanding of efficiency is very clearly interconnected with the presence and ability of the agent. Then, maximum efficiency, on the assumption of agent's life cycle, is to live longer, preserving economic activity. Local efficiency for the agent is, in particular, an efficiency of exchange, and the agent is exchanged with different efficiency at different age. According to his life cycle phases his preferences and utility function according to various kinds of blessings vary, priorities and individual estimation of utility change. Something that was useless becomes enduring value and vice versa. Classical theory of exchange does not take such transformation into consideration.

Having presented a firm as one agent, its maximum functioning efficiency is possible to be set through viability criterion, instead of measuring it with profit, sales volumes, production or used resources. For example, in Russia in 1990-2000s about 50 % of industry (and in some years even more) were unprofitable from the point of view of financial principles. Actually, production and employment were carried out by bankrupts. Liquidation of these enterprises would have led to abolition of the whole branches and spheres of human activity, unemployment growth and would have strengthened social and economic instability. If we compare two variants of development, without any doubts, the first variant resolving functioning of unprofitable industry is effective. Moreover, for a certain historical interval it can be the most effective relative to other variants.

Let's suppose that there is an exchange between two independent agents. One agent has a sum of real money M_{i1}, the other - M_{j2}. This real income can be spent on a certain set of blessings $x_1, \ldots x_i \ldots x_n$ having real prices accordingly $p_1, \ldots p_i \ldots p_n$ and the second agent buys $x_1 \ldots x_j \ldots x_m$ at the prices $p_1 \ldots p_j \ldots p_m$. If we assume, that all income is spent for some blessings, and the set of the blessings does not generally coincide for agents (with probable coincidence of some separate blessings for agents), it is possible to present:

$$M_{i1} = \sum_{i=1}^{n} p_{i1} x_{i1} \quad , \quad M_{j2} = \sum_{j=1}^{m} p_{j2} x_{j2}$$

Real income of two agents is unequal, so there is inequality and disparity of exchange conditions. It is possible to present the situation, having introduced parameter α (t) - benefits of the exchange: $M_{J2} = \alpha(t) M_{i1.}$ Then, it is possible to write down:

$$\alpha(t) = \frac{\sum_{j=1}^{m} p_{j2} x_{j2}}{\sum_{i=1}^{n} p_{i1} x_{i1}}$$

If from all multitude of blessings two agents exchange one or two kinds of blessings, then Pareto-efficiency on this separate exchange is not in any way connected with the efficiency of all set of exchanges in which the agent participates. Moreover, the difference of coefficient α (t) from unity will mean, that one of the agents has benefits in the exchange, because it has an advantage in consumption (according to his income). The agent can get the income only at the expense of the asset which he possesses. Therefore, having set vector y_i – agent's assets and prices r_i, it is possible to understand, that advantages in the exchange are connected with the assets availability and their cost. If part of the assets is saved, then, it is possible to write down expressions for each of the agents:

$$\sum_{i=1}^{k} r_{i1} y_{i1} + S_{i1} = \sum_{i=1}^{n} p_{i1} x_{i1},$$

$$\sum_{j=1}^{z} r_{j2} y_{j2} + S_{j2} = \sum_{j=1}^{m} p_{j2} x_{j2}$$

In this case, it is possible to present the inequality in the exchange by the relation of saved income parts. Here, there is a problem connected with the fact that, when the agent buys the blessing, there is an exchange of money for this blessing. Hence, real cash income and difference in it ensure unequal exchange. Indifference curves of such agents will never be in one point according to the definition of the given starting position, because initial utilities connected with real income estimation are different, though on certain blessings there may be points of contact in general case. Different incomes can bring the same utility only accidentally. Agent, having smaller advantages in the exchange, will always aspire to receive them equally with the second agent. That means, he feels that total utility of the blessings obtained by him is lower than the utility the second agent has.

IV. LINDAHL-WICKSELL MODEL

The "voluntary" exchange model of Lindahl - Wicksell (see Figure 2) is a good illustration of the problems connected with the exchange.

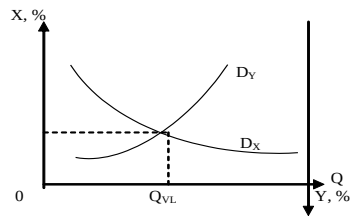

Fig. 2. Voluntary Exchange Model of Lindahl – Wicksell

This model describes production of public goods which should be financed at the expense of

special tax and with the unanimity of all members of economy concerning the consumption volume of the good. As follows from the Figure, equilibrium is achieved when the marginal tax rate, to be more precise, agent's income share, paid as a tax in the total value of the tax, is equal to the marginal utility from consumption of this public good. In the Figure the economy of two agents X and Y is shown, and, with the growth of X's share in this tax payment the consumption volume of the good is reduced. To be more precise, the volume of the public good which this agent would like to consume at the increased tax burden is reduced. At a high share the agent does not wish to consume the public good because production costs of this good are much greater than benefits and utility which the agent has from its consumption. As the expenses of agent X decrease, he would like to consume more of the good. The same logic, according to Lindahl, is applicable to agent Y. Here, it is implicitly supposed, that good provision automatically means improvement according to Pareto. Besides, each agent is considered to be able to define the proportion between the tax size paid for production of the public good and the scale of its consumption. However, the specified assumptions, in my opinion, are absolutely inadequate. The problem is not even in the fact that one agent will aspire to consume the good for account of the other one. It is a classic

The example of the "fare dodger" model which, by the way, destroys the unanimity rule not only the possible variants of the scheme and organization of corresponding consumption groups of this good, but it also changes orientation of motivational vector. The matter is that the increasing share of specified special tax payment can create motivation of larger quantity of the good which the agent would like to consume, but not vice versa. Besides, how the equilibrium for all groups of agents can be defined and the total finance received for production of the goods with the results of this production, and then with their distribution can be correlated.

Does perfect competition correspond to effective resources distribution? According to the neoclassical models and Pareto theory it does. However, even according to this theory the private property on the means of production is not obligatory as competition can exist without this institution, or with its smaller influence. For the competitive model to function it is enough for employees to achieve the goal of turning to advantage, and for managers to set the function of their own profit maximization. Thus the price system can be decentralized and taxes can allow leveling the arising disproportions in income. It is a classical variant of market socialism theory of Lange - Lerner [2, c.548].

V. CONCLUSIONS

Thus, maximum efficiency can be reached in absolutely different ways at one and the same form of social life organization. But if different forms of economic system organization are considered, it is difficult to answer definitely which of them allows reaching maximum efficiency. Having accepted, for example, according to A. Marshall, the living standard as the level of labor activity towards the level of requirements, it is important to bear in mind, that requirements are determined by international trade conditions, imitation effects, in particular, demo effect and others. Labor activity is also determined by many motivating factors, it having the explicit limit connected with the function of health reserve and qualification.

In economic system, whatever difficult it is, the finite number of resources, functions and actions is used. In this connection, the law of decreasing and increasing return can be recognized as the condition of maximum efficiency. In other words, the peak of maximum efficiency is achieved, when the increment of each resource, factor and action causes proportionally not smaller (smaller means the law of decreasing return), but larger (the law of increasing return) increase of the necessary blessing in the system. Actually, it means manufacturability of the system. With reference to labor resource it means that alternation of

generations should result in new cleverer, more inventive and more skillful generations than the previous one and they should possess greater health reserve and life span. The same condition can be considered as the main criterion of public progress. Certainly, all the process obeys the saturation law, because such biological system as a human being has finite potential in accumulation and use of knowledge. Thus, presenting it in a rough outline, it is possible to express progress as a permanent opposition to switching of the law of increasing return to the law of decreasing return which is ruinous for mankind. In other words, maximum efficiency conditions cannot be connected exclusively with surplus, but should actually mean those institutions which allow defining the return function in time and to make it increasing, having prevented any tendency to decrease, or having made a decrease interval as short as possible.

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