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MATHEMATICAL PROOF OF THE NEED CHANGES IN THE ECONOMY

Abstract

In the article, we prove theorems, which state, that effective economy can be only in that case, if on the majority of the market sectors are doing switching from the market to the plan (and return) controllably and that the "The Eevolutionary-Simulative Methodology" (ESM) can equally be used for the study of market self-regulation and planning.

Keywords

Market, Plan, The Evolutionary-Simulation Methodology, The Risk of overstating, The Risk of understatement, Equilibrium, Instrumental system, Theorem, Proof

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МАТЕМАТИЧЕСКОЕ ДОКАЗАТЕЛЬСТВО НЕОБХОДИМОСТИ ПЕРЕМЕН В ЭКОНОМИКЕ

Аннотация

В статье дано доказательство теорем, утверждающих, что эффективной может быть только такая экономика, в которой на большинстве секторов рынка осуществляется управляемое переключение с рынка на план и обратно и что Эволюционно-симулятивная методология в равной мере может быть применена как для исследования рыночной саморегуляции, так и планового управления.

Ключевые слова

Рынок, план, Эволюционно-симулятивный метод, риск завышения, риск занижения, равновесие, инструментальная система, теорема, доказательство

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MATHEMATICAL PROOF OF THE NEED CHANGES IN THE ECONOMY

In the entire history of the economy has only two ways of organizing economic relations: market and planned. Theorems discussed in this article, not only convert into the mathematical facts are known weaknesses of market and plan, but also, and it the most importantly, conclusively prove that effective economy can be in only that case if on the majority of the market sectors are doing switching from the market to the plan (and return) controllably. Feature of the current state of the domestic and global economy is that there is a possibility in principle to carry out a such switching, without breaking the property rights. A situation in which on the some of the sectors of market is realized market self-regulation, on the other market sectors at the same time is realized planning, or when in the different periods of time on one and the same of sector of market is realized the market self-regulation, and in the other period of time - planning, is quite acceptable.

Importance of theorems, that they:

- First, open up the possibility to use the technology of the analysis of balance of the risk of overstating and the risk of understating for study market self-regulation and planned management;
- Second, based on the theorems can be developed criteria for situations in which it is necessary to switch from the market to the plan (or return) for the particular sector of the market;
- Thirdly, the theorems indicate limitations for application the planning and for the market self-regulation (for example, planning should not equalise conditions work for producers with different prime cost).

Ability to formulate and prove theorems was appeared in connection with the discovery of the Equilibrium Stochastic Processes (ESP), finding-out of the role these processes for the economy and the development the universal methodology of mathematical modeling of ESP, namely the Evolutionary-Simulative Methodology [1] (see [1,2,3,4]).

Both when the market and when the plan, it is generating ESP. Formulations of the theorems are based on the construction of “the Evolutionary-Simulation Models” (ESM) of market and of plan, of comparing these models and of study their properties. Ways to create management tools, that are suitable for practical application in the economy, are based on working out ESM for specific ESP and realisation these models in the module "Equilibrium" of the instrumental system "Decision" [2]. This technology has been repeatedly and thoroughly tested, in particularly for the study the various of markets, such as e-commerce market (see [5]), software market [6,7], etc. "Decision" allows you to create software, adapted to the specific goals for economic management.

Theory of the Equilibrium Stochastic Processes (see [4] [3]) is scientific base for creation necessary methodological and mathematical maintenance, software for expansion of management to those areas of the economy, which, on the one hand, is still are inaccessible to management, but, on the other hand, as follows from the theorems, by which absolutely necessary to management.

Let's start with the specification of the basic concepts. Usually understood: the market is an aggregate of economic relations, based on regular, voluntary exchange between producers and consumers of goods; the plan - the advance thought over actions to achieve a certain goal. We mean the plans, which are aimed to manufacture and sale of certain goods (services and securities we view as a kind of goods).

Peculiar mechanism forming of the sales volumes and the prices has the market system and the planned system. The effect of these mechanisms is always localized in time and space, in which there is a certain sector of the market certain product (product group). We use the following definitions:

Market mechanism (MM) - a mechanism of spontaneous determination of sales volume and prices of a particular sector of the market, based on supply and demand.

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[1] http://ru.wikipedia.org/wiki/Эволюционно_симулятивный_метод

[2] ”Decision” – system making optimal decisions under uncertainty and risk. See http://www.decision-online.ru/

[3] An electronic version of the book, see the "Публикации" section on the website http://www.decision-online.ru/.

Planning mechanism (PM) – a mechanism that acts on a specific sector of the market, based on the fact that the volume of sales and the price is set as the target figures, and the system of economic incentives provides for fines and prize, depending on the size and direction of the deviation of the actual values from the target figures.

Consider the simplest structural mathematical formulations of the Evolutionary-Simulation Model of MM and PM. For the formulation the ESM of market, we introduce the following notation:

Fa^{MM} - the expected effective demand (random variable in physical units);

PL^{MM} – the equilibrium volume of sales (deterministic variable);

C^{MM} – price of commodity;

S^{MM} – prime cost of goods.

Relations (1) – (3) are representing ESM of the market:

$$F_1^{MM} = S^{MM}\left(PL^{MM} - Fa^{MM}\right), PL^{MM} \geq Fa^{MM} \quad (1)$$

$$F_2^{MM} = \left(C^{MM} - S^{MM}\right)\left(Fa^{MM} - PL^{MM}\right), PL^{MM} < Fa^{MM} \quad (2)$$

$$\min_{PL^{MM}}\left\{\max_{i\in\{1,2\}}\left\{M\left\{F_i^{MM}\right\}\right\}\right\} \quad (3)$$

In this case:

- F_1^{MM} - the expenses of overstating (arise of the aggregate producer, in a situation where supply of goods on the market exceeds demand);

- F_2^{MM} - the expenses of understating (arise of the aggregate producer, in a situation when the supply of goods on the market is less than demand);

- $M\left\{F_i^{MM}\right\}$ - the expectation of the expenses of overstating (the risk of overstating) if $i = 1$ and expenses of understating (the risk of understating) if $i = 2$.

We now turn to the structural mathematical formulation of ESM of plan. Let:

Fa^{PM} - expected volume of production (random variable in physical units);

PL^{PM} – the plan of production (or plan of sales) (deterministic variable);

U^{PM} – parameter of the system of provision of economic incentives, which determines the size of expenses from overfulfilment of the plan (for example, the value of specific losses arising from the need to storage and utilization the production over and above plan);

Q^{PM} – parameter of the system of provision of economic incentives, which determines the size of expenses from non-fulfillment of the plan (the penalty for deliver short of the unit production).

Relations (4) – (6) are representing ESM of the plan:

$$F_1^{PM} = U^{PM}\left(PL^{PM} - Fa^{PM}\right), PL^{PM} \geq Fa^{PM} \tag{4}$$

$$F_2^{PM} = Q^{PM}\left(Fa^{PM} - PL^{PM}\right), PL^{PM} < Fa^{PM} \tag{5}$$

$$\min_{PL^{PM}}\left\{\max_{i\in\{1,2\}}\left\{M\left\{F_i^{PM}\right\}\right\}\right\} \tag{6}$$

In this case:

- F_1^{PM} - the expenses of overstating (for the planning authorities in a situation when the supply of goods on the market more than a real need);

- F_2^{PM} - the expenses of understating (for the planning authorities in a situation where the plan is not executed);

- $M\left\{F_i^{PM}\right\}$ - the risk of overstating, for $i = 1$ and the risk of understating for $i = 2$.

Models (1) - (3) and (4) - (6) are constructed with the row obvious simplifying assumptions: we are leave out of account taxes, the factors determining demand, failures in the production; assumed that the goods, which are not sold entirely lost; are not considered methods of formation of product groups, etc. In working out specific ESM and their realization in the module "Equilibrium" all features may be take into account with the details and with the completeness.

Let $C^{\sup} = \Psi^{\sup}\left(V^{\sup}\right)$ - the supply function, which connect the supply price C^{sup} with the overall supplies V^{dem}; $C^{dem} = \Psi^{dem}\left(V^{dem}\right)$ - the demand function, which connect the demand price C^{dem} with the volume of demand V^{dem} (see Fig. 1). $V^{\sup} = \Psi^{(-1)\sup}\left(C^{\sup}\right)$ and $V^{dem} = \Psi^{(-1)dem}\left(C^{dem}\right)$ – the inverse functions.

We will introduce a few indicators of the market and the plan, which flow from of models (1) - (3) and (4) - (6).

Reliability is called the probability P^{MM} that sales PL^{MM} will be less or equal to the effective demand Fa^{MM}, ie $P^{MM} = P\left(Fa^{MM} \geq PL^{MM}\right)$, or probability P^{PM} that the production plan PL^{PM} less or equal to the actual demand Fa^{PM}, ie $P^{PM} = P\left(Fa^{PM} \geq PL^{PM}\right)$.

Overstating/Understating (O/U) expresses the ratio of risks, under which the business operates on the market (O/U^{MM}) or in the conditions of the plan (O/U^{PM}). O/U is the ratio of the slope angle $\angle\alpha$ of curve of the risk of overstating to the slope angle $\angle\beta$ of curve of the risk of understating for some volume of sales PL^{PM}, ie $3/3^{MM} = \frac{\angle\alpha}{\angle\beta}$ (see Fig. 1). In the linear approximation, adopted in the formulation of the model (1) - (3), the risk of overstating for unit of goods is expressed by prime cost of the goods S^{MM}, and the risk of understating for unit of goods – by the profit per unit of goods $\left(C^{MM} - S^{MM}\right)$, thus: $3/3^{MM} = \frac{S^{MM}}{C^{MM} - S^{MM}}$. Under the assumptions, made in the formulation of the model (4) - (6): $3/3^{PM} = \frac{U^{PM}}{Q^{PM}}$.

The average income of unit on capital Z^{MM} is expressed by the ratio of profit to the prime cost per unit: $Z^{MM} = \frac{C^{MM} - S^{MM}}{S^{MM}}$. The average income of unit on capital is inverse value to "Overstating/Understating", ie $Z^{MM} = \frac{1}{3/3^{MM}}$ and $Z^{PM} = \frac{1}{3/3^{PM}}$.

The average income of unit on capital taking into account risk $D^{MM} = Z^{MM} P^{MM}$ or $D^{PM} = Z^{PM} P^{PM}$.

The capitalization of sector of the market $K_j^{MM} = C_j^{MM} PL_j^{MM}$ or $K_j^{PM} = C_j^{PM} PL_j^{PM}$, where j – number of the sector.

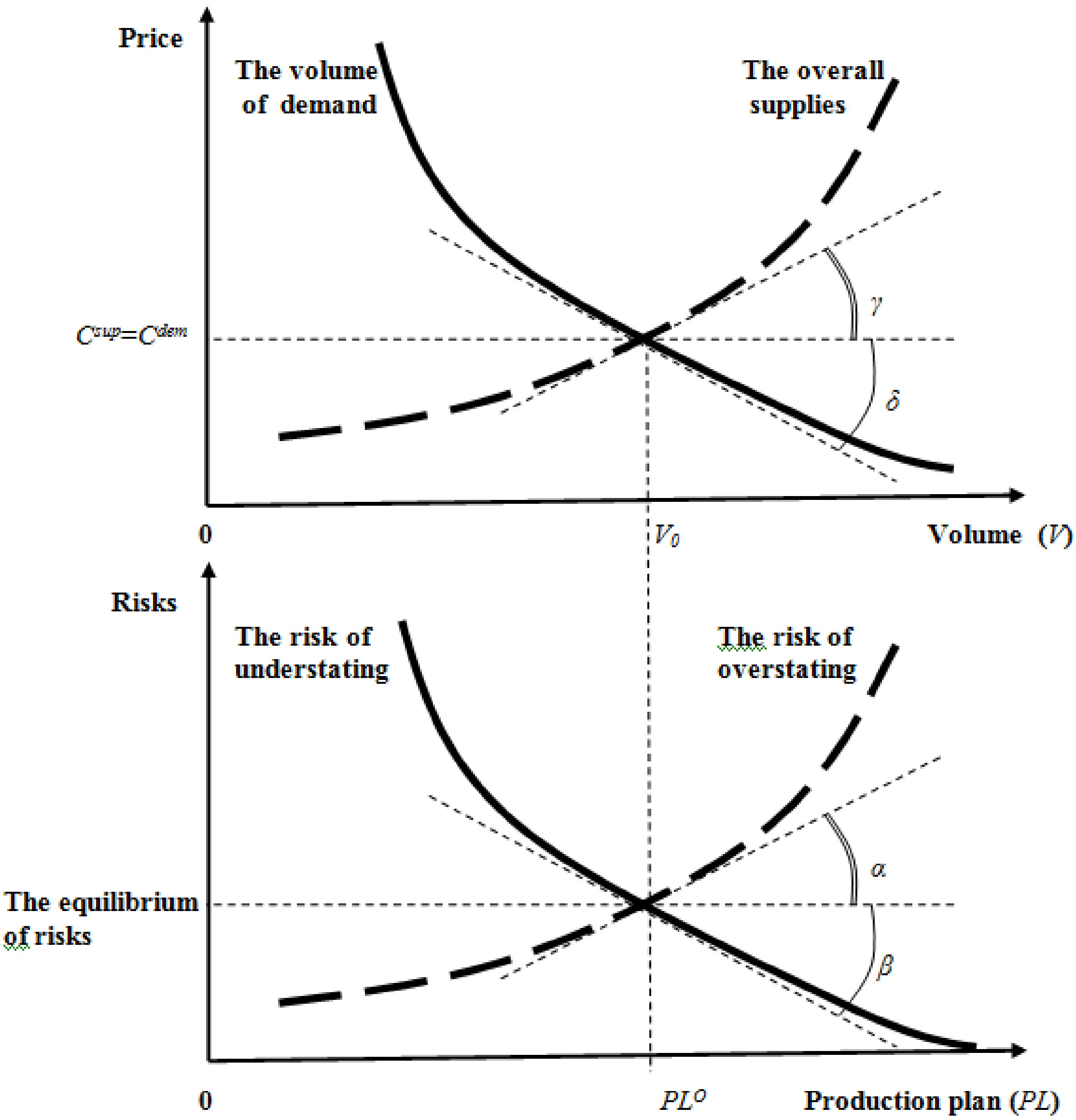

Fig. 1: The balance of supply and demand and the balance of risks.

Further, if necessary, we will assume that there are N sectors of the markets, forming a closed system, and capital can flow only between sectors of this system.

Let's address to Theorem 1 - the basic theorem of the Theory of Equilibrium Stochastic Processes. The theorem states that the balance of risks is equivalent to the balance of supply and demand. It provides an opportunity to move from studies of equilibrium of supply and demand (which is base for classical economics), to studies the equilibrium of the risk of overstating and the risk of understating and apply for this Evolutionary-Simulation Methodology and the instrumental system "Decision".

Theorem 1. *If the domain of values of the demand function and domain of values of the supply function intersect, and the domain of values function of the risk of overstating and the domain of values function of the risk of understating intersect, if there are no stimulus for exit from balance in the form of an inequality the supply and demand or an inequality of the risk of overstating and risk of understating, then:*

1) the volume of sales PL^{MM}*, at which the risk of overstating equal to the risk of understating, coincides with the equilibrium* volume of supply and *demand* $V^{dem} = V^{sup}$ *;*

2) the price C^{MM}*, at which the risk of overstating equal to the risk of understating, coincides with the equilibrium price of demand and supply* $C^{dem} = C^{sup}$*;*

3) the ratio of the angle of slope curve of the risk of overstating $\angle\alpha$ *to the angle of slope curve of the risk of understating* $\angle\beta$ *in the neighborhood of the optimum* PL^0 *equally to the ratio the angle of slope curve of supply* $\angle\gamma$ *to the angle of slope curve of demand* $\angle\delta$ *in the neighborhood of the optimum* V_0 *(see Fig. 1).*

Proof. The supply function $\Psi^{\sup}$ increases monotonically, the demand function Ψ^{dem} decreases monotonically. These functions are single-valued, continuous, have a common domain of definition G ($V^{\sup} \in G$ and $V^{dem} \in G$), are defined on the entire domain of definition and have no singularities. The domain of values of these functions have the intersection, hence there is only single value of supply, which is equal to the equilibrium volume of demand $V = V^{\sup} = V^{dem}$ and only one the supply price, which equal to the equilibrium price of demand $C = C^{\sup} = C^{dem}$.

For any PL^{MM} the risk of overstating $R_1^{MM}\left(PL^{MM}\right)$, in accordance with (1), is $R_1^{MM}\left(PL^{MM}\right)=\int\limits_{PL^{MM}\geq Fa^{MM}} S^{MM}\left(PL^{MM}-Fa^{MM}\right) f^{MM}\left(Fa^{MM}\right)dFa^{MM}$, where $f^{MM}\left(Fa^{MM}\right)$ - the probability density of distribution of values Fa^{MM}. The domain of definition of the function $R_1^{MM}\left(PL^{MM}\right)$ coincides with the domain of values Fa^{MM} and coincides with the domains of definition $\Psi^{\sup}$ and Ψ^{dem}. In other words, $Fa^{MM}\in G$ and $PL^{MM}\in G$. The function $R_1^{MM}\left(PL^{MM}\right)$ is single-valued, continuous, increases monotonically, is defined on domain G and have no singularities.

Likewise, for any PL^{MM} the risk of understating $R_2^{MM}\left(PL^{MM}\right)$, according to (2) is expressed by the formula $R_2^{MM}\left(PL^{MM}\right)=\int\limits_{PL^{MM}<Fa^{MM}}\left(C^{MM}-S^{MM}\right)\left(Fa^{MM}-PL^{MM}\right) f^{MM}\left(Fa^{MM}\right)dFa^{MM}$. The domain of definition of the function $R_2^{MM}\left(PL^{MM}\right)$ is the same as the domain of definition $R_1^{MM}\left(PL^{MM}\right)$. Function $R_2^{MM}\left(PL^{MM}\right)$ is single-valued, continuous, monotonically decreasing, defined on the whole of G and have no singularities.

Since the domains of values of the functions $R_1^{MM}\left(PL^{MM}\right)$ and $R_2^{MM}\left(PL^{MM}\right)$ intersect, then there is a unique equilibrium PL^{MM}, which satisfies the condition (3). Under condition of equilibrium no incentive to exit from them. This means that if PL^{MM} - the equilibrium plan of sales, then both conditions must be met: $R_1^{MM}\left(PL^{MM}\right)=R_2^{MM}\left(PL^{MM}\right)$ and $\Psi^{\sup}\left(PL^{MM}\right)=\Psi^{dem}\left(PL^{MM}\right)$. Similarly, if V - equilibrium volume of supply and demand, then both conditions must be met: $R_1^{MM}\left(V\right)=R_2^{MM}\left(V\right)$ and $\Psi^{\sup}\left(V\right)=\Psi^{dem}\left(V\right)$. This is only possible, when $PL^{MM}=V$. Indeed, suppose that $PL^{MM}>V$ and both conditions are satisfied: $\Psi^{\sup}\left(V\right)=\Psi^{dem}\left(V\right)$ and $R_1^{MM}\left(V\right)=R_2^{MM}\left(V\right)$. In this case is violated the condition $R_1^{MM}\left(PL^{MM}\right)=R_2^{MM}\left(PL^{MM}\right)$. By the monotonicity of functions

$R_1^{MM}\left(PL^{MM}\right) > R_1^{MM}\left(V\right)$ and $R_2^{MM}\left(PL^{MM}\right) < R_2^{MM}\left(V\right)$ have $R_1^{MM}\left(PL^{MM}\right) \neq R_2^{MM}\left(PL^{MM}\right)$. Similarly, if $PL^{MM} < V$, that violates one of the conditions of equilibrium. It proves the first assertion.

The equilibrium volume of supply and demand V uniquely determine the equilibrium price $C^V = \Psi^{\sup}\left(V\right) = \Psi^{dem}\left(V\right)$. Equilibrium the risk of overstating and the risk of understating also uniquely determines the price $C^{MM} = R_1^{MM}\left(PL^{MM}\right) = R_2^{MM}\left(PL^{MM}\right)$. From the expression for the function of the risk of understating $R_2^{MM}\left(PL^{MM}\right) = \int\limits_{PL^{MM} < Fa^{MM}} \left(C^{MM} - S^{MM}\right)\left(Fa^{MM} - PL^{MM}\right) f^{MM}\left(Fa^{MM}\right) dFa^{MM}$ follows that at constant PL^{MM} and, other things being equal, the risk of understating is a single-valued function of prices C^{MM}. At the same time, all other things being equal $R_2^{MM}\left(PL^{MM}\right)$ is a single-valued function PL^{MM} at a fixed price C^{MM}. The equilibrium condition fixes the risks, that is $R_1^{MM}\left(PL^{MM}\right) = R_2^{MM}\left(PL^{MM}\right) = const$. In this case, PL^{MM} and C^{MM} one-to-one determine each other, hence, there is a function $C^{MM} = \Phi\left(PL^{MM}\right)$.

Inverse functions Φ^{-1}, $\Psi^{(-1)\sup}$ and $\Psi^{(-1)dem}$, as well as the functions $\Psi^{\sup}$ and Ψ^{dem} - are single-valued, continuous, monotonous, are defined on the entire domain of definition and have no singularities. In particular, $\Psi^{(-1)\sup}$ increases monotonically and the $\Psi^{(-1)dem}$ decreases monotonically. For the conditions of Theorem equality: $PL^{MM} = \Phi^{-1}\left(C^{MM}\right)$, $V = \Psi^{(-1)\sup}\left(C^V\right)$ and $V = \Psi^{(-1)dem}\left(C^V\right)$ must be executed simultaneously, and moreover, according to the 1st statement of the theorem, $PL^{MM} = V$. This is only possible if the $C^V = C^{MM}$. Indeed, suppose $C^V \neq C^{MM}$. Suppose, for example, $C^V > C^{MM}$ and $PL^{MM} = \Phi^{-1}\left(C^{MM}\right) = V = \Psi^{(-1)\sup}\left(C^V\right)$. In this case, from the monotone increase of $\Psi^{(-1)\sup}$ follows, that $\Psi^{(-1)\sup}\left(C^V\right) > \Psi^{(-1)\sup}\left(C^{MM}\right)$, and from the monotone decrease of $\Psi^{(-1)dem}$ follows that $\Psi^{(-1)dem}\left(C^V\right) < \Psi^{(-1)dem}\left(C^{MM}\right)$, and

$\Psi^{(-1)\sup}\left(C^V\right) \neq \Psi^{(-1)dem}\left(C^V\right)$, which contradicts the hypothesis. In other words, from the $PL^{MM} = V$ follows, that both $C^V = \Psi^{\sup}\left(V\right) = \Psi^{dem}\left(V\right)$ and $C^{MM} = \Phi\left(PL^{MM}\right)$ - is the price of the same product in the same equilibrium point. Therefore $C^{MM} = C^V$, that proves the second assertion.

The angle of slope curve of the risk of overstating in the neighborhood of the optimum $\angle\alpha = \lim\limits_{\Delta\to 0}\dfrac{R_1^{MM}\left(PL^{MM}+\Delta\right) - R_1^{MM}\left(PL^{MM}\right)}{\Delta}$. The angle of slope curve of the risk of understating in the neighborhood of the optimum $\angle\beta = \lim\limits_{\Delta\to 0}\dfrac{R_2^{MM}\left(PL^{MM}\right) - R_2^{MM}\left(PL^{MM}-\Delta\right)}{\Delta}$. Under the assumptions, under which formulated a model, (1) - (3), $3/3^{MM} = \dfrac{\angle\alpha}{\angle\beta} = \dfrac{S}{C-S}$.

The angle of the supply curve in the neighborhood of the optimum $\angle\gamma = \lim\limits_{\Delta\to 0}\dfrac{\Psi^{\sup}\left(V+\Delta\right) - \Psi^{dem}\left(V\right)}{\Delta}$. The angle of the demand curve in the neighborhood of the optimum $\angle\delta = \lim\limits_{\Delta\to 0}\dfrac{\Psi^{dem}\left(V\right) - \Psi^{dem}\left(V-\Delta\right)}{\Delta}$. In a sufficiently small neighborhood of the optimum in the linear approximation $C^{\sup} = \Psi^{\sup}\left(V^{\sup}\right) = h^{\sup} * V^{\sup}$ and $C^{dem} = \Psi^{dem}\left(V^{dem}\right) = h^{dem} * V^{dem}$. Hence $\angle\gamma = \lim\limits_{\Delta\to 0}\dfrac{h^{\sup}\left(V+\Delta\right) - h^{\sup}V}{\Delta} = h^{\sup}$ and $\angle\delta = \lim\limits_{\Delta\to 0}\dfrac{h^{dem}V - h^{dem}\left(V-\Delta\right)}{\Delta} = h^{dem}$. So $\dfrac{\angle\gamma}{\angle\delta} = \dfrac{h^{\sup}}{h^{dem}}$.

By definition, the marginal utility of the benefit - it's behoof, which brings the last unit of this benefit. The latter benefit must meet to the most unimportant requirement. If the benefit express in money, then utility curves change into the supply curve and the demand curve for consumers and producers correspondently. According to this definition, the quantity h^{np} expresses the proportion, on which the price has to be increased, to compensate the losses in the case if delivery to the market will be V units of goods instead of $V + 1$ units of goods and one unit will not be sold. In other words, the price C on goods should be changed to quantity $h^{\sup}$, to compensate for the loss in size of the prime cost of unit goods S, that is $h^{\sup}CV^{\sup} = S$. Hence $h^{\sup} = \frac{S}{C * V^{\sup}}$.

The quantity h^{dem} expresses the proportion, on which the price has to be increased, to compensate for the losses in the case delivery to the market V - 1 units of goods instead V units of goods, that is $h^{dem}CV^{dem} = (C - S)$. Hence $h^{dem} = \frac{C - S}{C * V^{dem}}$.

So $\frac{\angle\gamma}{\angle\delta} = \frac{h^{\sup}}{h^{dem}} = \frac{S}{C - S} = \frac{\angle\alpha}{\angle\beta} = 3/3^{MM}$. This proves the third statement of Theorem. ■

Turn next to the theorem, which states, that in any sector of the market is always possible to introduce planning and choose a system of economic incentives that the situation would be equivalent to the market self-regulation. It must be borne in mind, that this equivalence is limited to typically, very small interval of time during which remain unchanged all external and internal conditions for this sector of the market.

Theorem 2. *In any sector of the market can be established sales plan PL^{PM} and choose the parameters of the system of economic incentives U^{PM} and Q^{PM} so, that the plan PL^{PM} will be coincide with the equilibrium volume of supply and demand PL^{MM}.*

Proof. For any PL^{PM} the risk of overstating $R_1^{PM}\left(PL^{PM}\right)$, in accordance with (4), is equal to $R_1^{PM}\left(PL^{PM}\right) = \int\limits_{PL^{PM} \geq Fa^{PM}} U^{PM}\left(PL^{PM} - Fa^{PM}\right) f^{PM}\left(Fa^{PM}\right) dFa^{PM}$, where $f^{PM}\left(Fa^{PM}\right)$ - the probability density of distribution of values Fa^{PM}. In accordance with (5) the risk of understating $R_2^{PM}\left(PL^{PM}\right)$ for each PL^{PM} is expressed by the formula $R_2^{PM}\left(PL^{PM}\right) = \int\limits_{PL^{PM} < Fa^{PM}} Q^{PM}\left(Fa^{PM} - PL^{PM}\right) f^{PM}\left(Fa^{PM}\right) dFa^{PM}$. Condition (6) is equivalent to $R_1^{PM}\left(PL^{PM}\right) = R_2^{PM}\left(PL^{PM}\right)$. Opening it, we get:

$$\int_{PL^{PM} \geq Fa^{PM}} U^{PM}\left(PL^{PM} - Fa^{PM}\right) f^{PM}\left(Fa^{PM}\right) dFa^{PM} =$$

$$= \int_{PL^{PM} < Fa^{PM}} Q^{PM}\left(Fa^{PM} - PL^{PM}\right) f^{PM}\left(Fa^{PM}\right) dFa^{PM}$$

Assuming, that the probability density function $f^{PM}\left(Fa^{PM}\right)$ is approximated by a continuous law of distribution of probabilities, which can be integrated, also considering the type of integrand, we can say, that the solution to this integral equation exists and has the form of a continuous, single-valued, defined on the whole domain of values function, without singularities $PL^{PM} = \Theta^{PM}\left(U^{PM}, Q^{PM}\right)$.

Application the planning system does not change the domain of definition of the supply function and the demand function, that is, $Fa^{PM} \in G$ and $PL^{PM} \in G$ as well as $Fa^{MM} \in G$ and $PL^{MM} \in G$, ie G is the domain of values of the function Θ^{PM}. Consequently, there exist such U'^{PM} and Q'^{PM}, that $\Theta^{PM}\left(U'^{PM}, Q'^{PM}\right) = PL^{PM} = PL^{MM}$. That was required to prove. ■

Theorems 3 - 6 help to explain the defects of market economy. To solve these problems, it is necessary to extend management to the new areas of the economy, namely:

- Capital flow between sectors of the market (Theorems 3 and 4);
- Stability of markets (Theorem 5);
- Coverage of different categories of buyers on the sector of the market (Theorem 6).

Economic science, assuming that it does not include the ESP Theory, is not able to give appropriate tools to address these management tasks. ESP Theory and instrumental system "Decision" give such possibility.

Theorem 3. *In a closed system of the market sectors there is a capital flow from the sector j in which a average income of unit on capital taking into account risk* D_j^{MM} *(or* D_j^{PM}*) lower to the sector j' where a average income of unit on capital taking into account risk* $D_{j'}^{MM}$ *(or* $D_{j'}^{PM}$*) higher.*

Proof. Consider two market sector j and j'. Suppose that in the initial time t was $D_{j,t}^{MM} = D_{j',t}^{MM}$ and $PL_{j,t}^{MM} = PL_{j',t}^{MM}$. Let's say that to the time $t + \tau$ the sector j remained without changes, while on the sector j' the average income of unit on capital taking into account risk increased and became $D_{j,t+\tau}^{MM} < D_{j',t+\tau}^{MM}$. We need to prove that $PL_{j,t+\tau}^{MM} < PL_{j',t+\tau}^{MM}$.

Substituting $Z_j^{MM} = \dfrac{1}{3/3_j^{MM}}$ to $D_j^{MM} = Z_j^{MM} * P_j^{MM}$ we will find $D_j^{MM} = \dfrac{P_j^{MM}}{3/3_j^{MM}}$. For any market sector j the model (1) - (3), all other things being equal, connects the variables $3/3_j^{MM}$, PL_j^{MM} and P_j^{MM} by the following dependencies:

- increase P_j^{MM} leads to decrease PL_j^{MM} and to decrease $3/3_j^{MM}$;

- decrease $3/3_j^{MM}$ leads to increase PL_j^{MM} and to decrease P_j^{MM}.

In the transition from one market sector to another we should take into consideration the fact, that the reliability reflects the conditions for the business (higher reliability - better conditions) but the "Overstating/Understating" - ratio incentives. Therefore, if the capital is moving, we see changes the dependences PL_j^{MM} and $3/3_j^{MM}$ from reliability on the inverse: that is, from $P_{j',t+\tau}^{MM} > P_{j,t+\tau}^{MM}$ it follows that $PL_{j',t+\tau}^{MM} > PL_{j,t+\tau}^{MM}$ (ceteris paribus the capital flow from the worst conditions, where lower reliability, to the best). In this case, the direction of stimulus remains same: the less the ratio of the risk of overstating and the risk of understating, the better for the business, ie $3/3_{j',t+\tau}^{MM} < 3/3_{j,t+\tau}^{MM}$ entails $P_{j',t+\tau}^{MM} > P_{j,t+\tau}^{MM}$. Thus, at the movement business from one sector to another there are dependences:

- Increase P_j^{MM} entails increase PL_j^{MM} and decrease $3/3_j^{MM}$ (increase reliability attracting capital from other sectors creates a better ratio of risks for employed capital);

- decrease $3/3_j^{MM}$ entails increase PL_j^{MM} and increase P_j^{MM} (increase of the ratio of risks increases the volume of the employed capital and increases the reliability of capital employed).

Thus, increase of the numerator in the expression $D_j^{MM} = \frac{P_j^{MM}}{3/3_j^{MM}}$ necessarily entails reducing of the denominator, and decrease of the denominator entails increase of the numerator. At the same time, as an increase of numerator, so and decrease of denominator are entails increases PL_j^{MM}. Therefore $D_{j,t+\tau}^{MM} < D_{j',t+\tau}^{MM}$ entails $PL_{j,t+\tau}^{MM} < PL_{j',t+\tau}^{MM}$. That was required to prove. ■

From Theorem 3 it follows that in a closed system of market sectors is inevitable capital flow from the all sectors of the market to one market sector, where the average income of unit on capital taking into account risk D_j^{MM} is highest.

If the dominance of the average income of unit on capital taking into account risk on the same sector of the market is not too long, the concentration of capital may contribute to the progressive growth investment to the most effective direction. If after this appear another most effective market sector (due to the emergence of new technologies, or new products, or changes in risks), the direction of capital flow will be change. At the same time, if the dominance of the average income of unit on capital taking into account risk go on for a long time on the same sector of the market, then appears imbalances and oligarchy with all known negative effects.

We introduce the notation:

- t – moment of time;
- $P_{j,t}$ - the probability, that $D_{j,t}^{MM}$ will be increased in moment of time t;
- $P_{j',j,t}$ - the likelihood of the situation $D_{j',t}^{MM} > D_{j,t}^{MM}$.

Theorem 4: *In the closed system of sectors of the market, in which:*

- in the initial situation, when $t = 0$ all sectors are identical $K_{j',t}^{MM} = K_{j,t}^{MM}, D_{j',t}^{MM} = D_{j,t}^{MM}, P_{j',t} = P_{j,t}, \forall j, j'$;

- when we the transition from t to $t+\tau$ - the value of $D_{j,t+\tau}^{MM}$ is changing under the casual law;

- when $D_{j',t}^{MM} > D_{j,t}^{MM}$ - the probability of occurrence of a situation $D_{j',t+\tau}^{MM} < D_{j,t+\tau}^{MM}$ is less, than it is more difference $D_{j',t}^{MM} - D_{j,t}^{MM}$

take place:

1) division of market sectors in level of capitalization;

2) $D_{j,t}^{MM}$ becomes greater, the more $K_{j,t}^{MM}$;

3) appears one market sector j', whose capitalization $K_{j',t}^{MM}$ and $D_{j',t}^{MM}$ are greatest and the probability of the situation $D_{j',t+\tau}^{MM} < D_{j,t+\tau}^{MM}$ for any $j \neq j'$ with increasing τ is infinitely comes nearer to 0 (impossible).

Proof. Suppose that at some moment time t the situation $D_{j',t+\tau}^{MM} > D_{j',t}^{MM}$ appeared as the result of increase $D_{j',t}^{MM}$. As a result, according to Theorem 3, to the market sector j' will flow a certain quantity of capital from those market sectors j, for which the condition $D_{j',t+\tau}^{MM} > D_{j,t+\tau}^{MM}$. Moving capital creates a situation in which both of the two inequalities: $D_{j',t+\tau}^{MM} > D_{j,t}^{MM}$ and $K_{j',t+\tau}^{MM} > K_{j,t}^{MM}$, are satisfied at least for some j. This in turn leads to further increase $D_{j',t+\tau}^{MM}$. Indeed, suppose that the capitalization increased $K_{j',t}^{MM}$. Because $K_{j',t}^{MM} = C_{j',t}^{MM} * PL_{j',t}^{MM}$ increase $K_{j',t}^{MM}$ can be only in a case if is increasing $PL_{j',t}^{MM}$, or is increasing $C_{j',t}^{MM}$. The model (1) - (3), all other things being equal, is connecting the variables $3/3_{j',t}^{MM}$, $PL_{j',t}^{MM}$ and $P_{j',t}^{MM}$ by the following dependencies: increasing $PL_{j',t}^{MM}$ entails increasing $3/3_{j',t}^{MM}$ and decreasing $P_{j',t}^{MM}$. When business are carrying from one sector to another, these dependences changes on the inverse, ie, an increase $PL_{j',t}^{PM}$ leads to a decrease $PL_{j',t}^{MM}$ leads to a decrease $3/3_{j',t}^{MM}$ and an increase $P_{j',t}^{MM}$. It means increase

$D^{MM}_{j',t} = \frac{P^{MM}_{j',t}}{3/3^{MM}_{j',t}}$. If there was an increase $C^{MM}_{j',t}$, it means decrease $3/3^{MM}_{j',t} = \frac{S^{MM}_{j',t}}{C^{MM}_{j',t} - S^{MM}_{j',t}}$. The model (1) - (3), all other things being equal, is connecting the variables $3/3^{MM}_{j',t}$ and $P^{MM}_{j',t}$ by following dependences: a decrease $3/3^{MM}_{j',t}$ leads to a decrease $P^{MM}_{j',t}$. When you transfer the business from one market sector to another, this dependence are changing on the reverse: a decrease $3/3^{MM}_{j',t}$ entails an increase $P^{MM}_{j',t}$. It means increase $D^{MM}_{j',t} = \frac{P^{MM}_{j',t}}{3/3^{MM}_{j',t}}$. Consequently an increase $K^{MM}_{j',t+\tau}$ leads to an increase $D^{MM}_{j',t}$, in turn an increase $D^{MM}_{j',t}$ leads to a further increase in capital inflow $K^{MM}_{j',t+\tau}$ and so on. This proves as the 1st and the 2nd statements of the theorem.

Let j' sector of the market, at which at the time of t value $D^{MM}_{j',t}$ is maximal and let $D^{m}_{j',t} = \max_{\forall j \neq j'} D^{MM}_{j,t}$. Since $D^{MM}_{j',t} > D^{m}_{j,t}$ then the inflow of capital in j' will be greater, than in any other sector j. From the 2nd statement of Theorem follows that in that case $D^{MM}_{j',t}$ increases larger, than $D^{MM}_{j,t}$. Thus, the more τ, the more $\Delta_\tau = D^{MM}_{j',t+\tau} - D^{m}_{j',t+\tau}$. The more Δ_τ the lower the probability of the event $D^{MM}_{j',t+\tau} < D^{m}_{j',t+\tau}$. This proves 3rd statement of the theorem. ■

By Theorems 3 and 4 in the market system, even if initially this system consisted from the exactly identical market sectors, even if the all economic agents were honest, no one uses insider information or illegal appropriation, no one suppresses competition, nevertheless inevitably arises oligarchy (financial) economic inequality, stratification by income. From the theorems also follows, that the market system itself is not able to get rid of the oligarchy, that the market can not be separated from social inequality and political tension. This means that in order to avoid a general economic collapse, capital flows need to be managed.

Theorem 5. *If in the market sector with the flow of time the indicator* O/U^{MM} *remains unchanged in the domain of definition of the supply function (which is equal to the domain of definition of the demand function) then if* O/U^{MM} *> 1 and active supplier or* O/U^{MM} *< 1 and active consumer is - the amplitude fluctuations of supply and demand increases indefinitely.*

Proof. Let V -equilibrium volume of supply and demand, and C – the equilibrium price. Let business offers the goods in volume $V_1^{\sup}$, hoping to sell goods at a price $C_1^{\sup} = \Psi^{\sup}\left(V_1^{\sup}\right)$ (point 1 in Fig. 2). For the price $C_2^{dem} = C_1^{\sup}$ the buyer is willing to show demand in the amount of $V_2^{dem} = \Psi^{(-1)dem}\left(C_2^{dem}\right)$ (point 2 in Fig. 2). When demand is equal to the volume of supply $V_3^{\sup} = V_2^{dem}$ the manufacturer forced to drop the price to $C_3^{\sup} = \Psi^{\sup}\left(V_3^{\sup}\right)$ (point 3 in Fig. 2). At the price $C_4^{dem} = C_3^{\sup}$ the buyer is willing to show demand $V_4^{dem} = \Psi^{(-1)dem}\left(C_4^{dem}\right)$ (point 4 in Fig. 2). When the demand increase $V_5^{\sup} = V_4^{dem}$, the producer increases price to $C_5^{\sup} = \Psi^{\sup}\left(V_5^{\sup}\right)$ (point 5 in Fig. 2) and so on. When $3/3^{MM} = \dfrac{\angle\alpha}{\angle\beta} > 1$ and $V_1^{dem} > V$ (as in Fig. 2) $\angle\alpha > \angle\beta$, and $V_2^{dem} < V_1^{\sup}$. $V_1^{\sup} - V_2^{dem} = \left(V_1^{\sup} - V\right) + \left(V - V_2^{dem}\right)$, ie the distance between points 2 and 1 is the sum of the two segments, where $\left(V_1^{\sup} - V\right)$ - the adjacent leg of an angle α, and $\left(V - V_2^{dem}\right)$ - the adjacent leg of an angle β. $C_2^{dem} - C_3^{\sup} = \left(C_2^{dem} - C\right) + \left(C - C_3^{\sup}\right)$ (distance between points 2 and 3 in Fig. 2) is the sum of $\left(C_2^{\sup} - C\right)$ opposed leg of the angle β and $\left(C - C_3^{\sup}\right)$ - opposed leg of the angle α. When $\angle\alpha > \angle\beta$, then $\left(V - V_2^{dem}\right) > \left(V_1^{\sup} - V\right)$; $\left(V - V_3^{\sup}\right) = \left(V - V_2^{dem}\right)$ and $\left(V_4^{dem} - V\right) > \left(V - V_3^{\sup}\right)$.

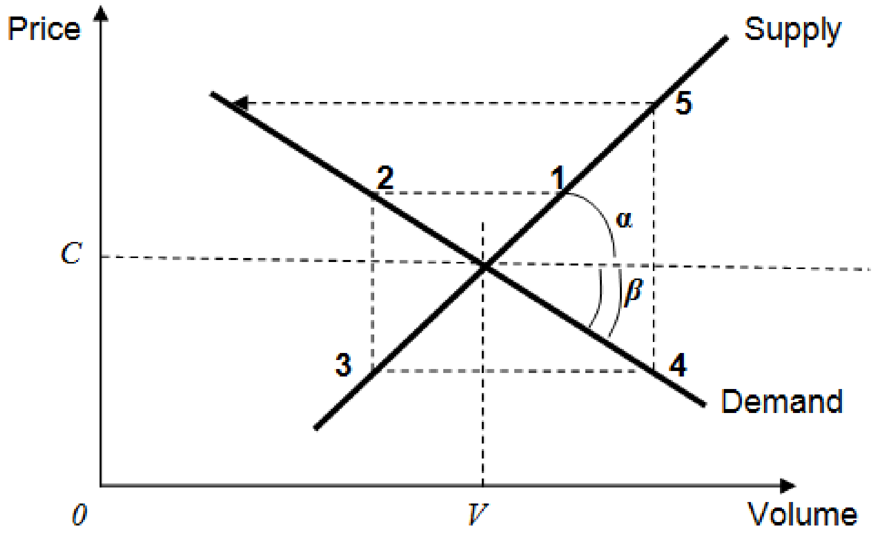

Fig. 2. Resonance instability.

Consequently $\left(V_1^{\sup} - V_2^{dem}\right) < \left(V_4^{dem} - V_3^{\sup}\right)$. Similarly, we can prove that for any N $\left(V_N^{\sup} - V_{N+2}^{dem}\right) < \left(V_{N+4}^{dem} - V_{N+3}^{\sup}\right)$ and $\left(C_{N+2}^{dem} - C_{N+3}^{\sup}\right) < \left(C_{N+5}^{\sup} - C_{N+4}^{dem}\right)$. For variants: $3/3^{MM} = \dfrac{\angle\alpha}{\angle\beta} > 1$, $V_1^{dem} < V$ and active supplier; $3/3^{MM} = \dfrac{\angle\alpha}{\angle\beta} < 1$, $V_1^{dem} > V$ and active consumer; $3/3^{MM} = \dfrac{\angle\alpha}{\angle\beta} < 1$, $V_1^{cnp} > V$ and active consumer similarly, we can prove similar results. That was required to prove. ■

The theorem shows that the market instability may occur, and it will lead to "overrunning" of the market. To eliminate the instability requires external intervention as a management.

Suppose that on a certain sector of the market there is $L > 1$ categories of buyers, and let φ_l - the vector of characteristics of category of buyers $l = 1,...,L$. Influence of a category of buyers l to the business (of suppliers of the goods to the market) we name the dependence of the equilibrium volume of sales PL^{MM} from φ_l, ie: $PL^{MM} = E_l(\varphi_l)$. At the same time, we assume, that changes can concern not only values of the components of vector φ_l, but also the composition of components (the kind of the law of distribution of probabilities).

Theorem 6. *If on a particular sector of the market there is $L > 1$ categories of buyers, then may be a situation, in which the degree of influence $\frac{E_l(\varphi_l+\Delta)-E_l(\varphi_l)}{\Delta}$ of certain categories of buyers l - is negligible.*

Proof. To prove the existential theorem it is necessary under the circumstances set out in the conditions of the theorem, to construct an example that demonstrates the existence of an object or situation. Since the theorem states, that the situation can exist, but not necessarily should exist, then the construction of the example is not only necessary but also sufficient for the proof of the theorem. Let $L = 2$, φ_1 and φ_2 - the quantity of buyers of category 1 and 2, a and b – average purchasing power of the buyer categories 1 and 2, accordingly. The expected effective demand:

$$Fa^{MM} = a\varphi_1 + b\varphi_2 \qquad (7)$$

Assume further that S^{MM} the sum of the basic elements of prime cost. With the sale of goods to customers of first category the prime cost increases in inverse proportion to the quantity of buyers of this category (due to the nature of delivery, packaging and advertising) and τ_1 - coefficient of proportionality. Consequently $S^{MM}\tau_1\varphi_1$ - the prime cost of the totality of goods sold to customers first category. Similarly $S^{MM}\tau_2\varphi_2$ - the prime cost of the sale of goods to customers second category. With these clarifications, equation (1) becomes:

$$F_1^{MM} = S^{MM}\frac{(\tau_1\varphi_1+\tau_2\varphi_2)}{Fa^{MM}}\left(PL^{MM}-Fa^{MM}\right), PL^{MM} \ge Fa^{MM} \qquad (8)$$

and equation (2) becomes:

$$F_2^{MM} = \left(C^{MM} - S^{MM}\frac{(\tau_1\varphi_1+\tau_2\varphi_2)}{Fa^{MM}}\right)\left(Fa^{MM}-PL^{MM}\right), PL^{MM} < Fa^{MM} \qquad (9)$$

The relations (3) and (7) - (9) are an example of Evolutionary-Simulation Model of market. Let the quantity of buyers of the first category has a constant law of distribution of probabilities with the constant parameters, ie $\varphi_1 = const$. For any change φ_2 (change in the parameters of the law of probability distribution of customer of category 2 or change of the form of the law of probability distribution), we can solve the problem (3), (7) - (9) and, thus, calculate PL^{MM}. Hence, we constructed dependence $PL^{MM} = E_2(\varphi_2)$. This dependence is defined algorithmically and reflects the influence of buyers 2nd category to the business (suppliers of the goods to the market). From (3), (7) - (9) it is obvious, that the less b and τ_2 then less $\frac{E_2(\varphi_2+\Delta)-E_2(\varphi_2)}{\Delta}$. In particular, when $b=\tau_2=0$ $\frac{E_2(\varphi_2+\Delta)-E_2(\varphi_2)}{\Delta}=0$. That was required to prove. ■

Theorem 6 reveals the mechanism of the rather obvious situations, which frequently encountered in life when the business is interested in serving specific, sometimes very narrow categories of customers, ignoring the others, which perhaps, make up the vast majority. This orientation of the business does not take into account any social, political, environmental, military, moral significance serviced customers or goods. As the saying goes, "nothing personal, just business." Significance of this theorem, first of all in the fact, that theorem identifies the important area, to which management should be extended, namely, to the field of potential buyers, which covers by business. Theorem allows us to specify not only the target, but also the ways of management.

The following 3 theorems, identify defects, inherent of planned economy. If the market price C^{MM} (see model (1) - (3)) is set automatically in accordance with supply and demand in a competitive environment (ideally on the exchange), the parameters of the system of economic incentives U^{PM} and Q^{PM} (see model (4) - (6)) established by the planning authority, and do not depend on the market situation. According to Theorem 2, these parameters can be selected so that $PL^{PM} = PL^{MM}$. However, there is no mechanism, which will force to choose exactly such values of the parameters of the system of economic incentives. Moreover, ideology and technology planning consists in achieve economic and political goals, which not only are not directly associated with market equilibrium, but even directly contrary to the requirements of the market equilibrium. Planning is necessary, first of all, for will get rid of market restrictions. Planning allow to ignore the competition, and in the presence of monopoly is the only possible way of managing.

At the same time, the planning inevitably combined, one hand, with the lack of objective reference points (of market prices) and, on the other hand, with the arbitrariness in setting the parameters of system of provision of economic incentives. This combination, sooner or later, but inevitably, is doing the system of provision of economic incentives of an inadequate situation. This gives rise to a variety of negative effects of the planned economy. Therefore, planning should be a temporary measure (except for natural monopolies, or market sectors, entirely aimed at the production of exclusively and only those products, that provide a defense, or social protection, or the environment protection).

Theorem 7. *All things being equal on any market sector j:*

1) *values* $3/3_j^{PM}$, PL_j^{PM} and P_j^{PM} *one-to-one determine each other;*
2) *increasing* $3/3_j^{PM}$ *entails to decreasing* PL_j^{PM} *and increasing* P_j^{PM} *;*
3) *increasing* PL_j^{PM} *entails to decreasing* P_j^{PM} *and increasing* $3/3_j^{PM}$ *.*

Proof. All the statements of the theorem are direct consequences of the formulation (4) - (6). That was required to prove. ■

From the theorem follows, that the political will to demand fulfillment and over-fulfillment of plans for all sectors of the market (increasing $3/3_j^{PM}$ for all *j*) leads to a total deficit (decreasing PL_j^{PM} for all *j*); the demand to increase the plans (increasing PL_j^{PM} for all *j*) lead to failures these plans (decreasing (for all P_j^{PM}). $3/3_j^{PM}$ is established by a choice of values of parameters of the system of provision of economic incentives. It means, that the incentives for businesses are determined only by governments. The producers are orientated by $3/3_j^{PM}$ and for them not interesting, whether have demand for the goods by consumers. It leads to appearance of overproduction, stocks of unclaimed goods above norm. We saw all this in the Soviet Union.

The meaning of the statements of the theorem 7 is determined by that model (4) - (6) reflects the basic technological and organizational features of the functioning of the planned economy. In particular, the 1st statement of the theorem means, for example, that with the same technology and production organization can not be increase the plan PL_j^{PM} and reliability P_j^{PM} at the same time.

The increase $3/3_j^{PM}$, in other words, the increase the incentives for implementing the plan and penalties for no implementing, inevitably leads to a reduction plans P_j^{PM} and increasing of reliability P_j^{PM} (2nd statement). One of the reasons why there is so, it is the work of lobbyists from the manufacturers, which are always present in any of planning authority.

The next theorem opens some important laws of functioning of the market, in which the price is set in a planned manner, and which is surrounded by sectors of the market with equilibrium prices.

<u>Theorem 8.</u> *If the parameter of the system of provision of economic incentives for the sector j' is the price* $Q_{j'}^{PM} = C_{j'}^{PM}$ *and during inflation* $C_{j'}^{PM}$ *is held at a constant level, then volume of sales* $PL_{j'}^{PM}$ *is reducing. This may be accompanied by a flow of capital into the sector j', so and capital outflow from the sector.*

<u>Proof.</u> In the assumption, that in the conditions of inflation the price C_j^{MM} rises so far as it is necessary to compensate for the increased prime cost S_j^{MM} value of $3/3_j^{MM} = \dfrac{S_j}{C_j - S_j}, \forall j \neq j'$ remain unchanged. At the sector j' constant price $C_{j'}^{PM} = Q_{j'}^{PM} = const$, and the prime cost $S_{j'}$ - increases. Hence $3/3_{j'}^{PM} = \dfrac{S_{j'}^{PM}}{C_{j'}^{PM} - S_{j'}^{PM}}$ increases. The model (3) - (6) connects the variables $3/3_{j'}^{PM}$, $PL_{j'}^{PM}$ and $P_{j'}^{PM}$ by the following dependencies: increase $3/3_{j'}^{PM}$ leads to reduce $PL_{j'}^{PM}$ (the 1st statement of the theorem) and an increase $P_{j'}^{PM}$. In this case $D_{j'}^{MM} = \dfrac{P_{j'}^{MM}}{3/3_{j'}^{MM}}$ can both increase and decrease (2nd theorem). That was required to prove. ■

According to the theorem if we hold rates at some of the sectors of the market, then it leads to a reduction the supply to this sector of the market by existing suppliers. It may be, depending on other factors, that influence to the reliability of the investment (risk level), accompanied inflows (in this case, it is likely to lead to the replacement of suppliers, which in turn, may be accompanied by either upgrading or degradation of production) or outflow of capital. In the latter case occurs a compression sector market.

The following theorem shows laws of interrelations of sectors of the market, in depending by the pricing policy, pursued by the planning authority.

Theorem 9. *If the sector j' differs from sector j only the prime cost of production ($S_{j'} > S_j$), if both sectors of the market planned, and the price is a parameter of the system of provision of economic incentives ($Q_j^{PM} = C_j^{PM}$ and $Q_{j'}^{PM} = C_{j'}^{PM}$) and is installed in such a way as to equalize the conditions of work manufacturers $\frac{S_{j'}}{C_{j'} - S_{j'}} = \frac{S_j}{C_j - S_j}$, then the capital flows from j to j'.*

Proof. According to the conditions of the theorem $PL_{j'}^{PM} = PL_j^{PM}$ (sectors are equivalent). Because $\frac{S_{j'}}{C_{j'} - S_{j'}} = \frac{S_j}{C_j - S_j}$ and $S_{j'} > S_j$ consequently $C_{j'} > C_j$ and $K_{j'} = C_{j'} PL_{j'}^{PM} > K_j = C_j PL_j^{PM}$. According to the statement 2 of the theorem 4 from $K_{j'} > K_j$ follows $D_{j'} > D_j$, and according to theorem 3, when $D_{j'} > D_j$ - capital flows from *j to j'.* That was required to prove. ■

This theorem can be called a theorem about egalitarianism. Trying to equalize working conditions leads to the fact, that the winner is the one who works less and have higher prime costs. Policy alignment of incentives leads to the preservation of inefficiency, flow of capital into inefficient sectors, stagnation, loss of incentives for laggards to catch up with leaders.

By Theorems 7 - 9 if operation of the planned economy lasts long enough, then disadvantages are summarized. It lead to appearance the total deficit, imbalance, disruption of plans, ineffectiveness. In the end, the economy simply becomes unmanageable.

As we saw earlier, according to Theorems 3 - 6, long-term operation of a market economy leads inevitably to the unlimited power of the oligarchy, inequality and the inevitable crash.

Taken together, these theorems indicate quite clearly, that may be effective only such economy, in which the switching from market to the plan and back is itself a sphere of government. ESM and "Decision" allow we to create the necessary tools to do so.

The proof of all the theorems was done by a logic conclusion in the framework of the two-valued logic. This is one of the main methods of obtaining new mathematical knowledge (mathematical facts). However, within the framework of the theory of Equilibrium Stochastic Processes, the importance has a way of a conclusion of statements of the theory, which is illustrated in Fig. 3.

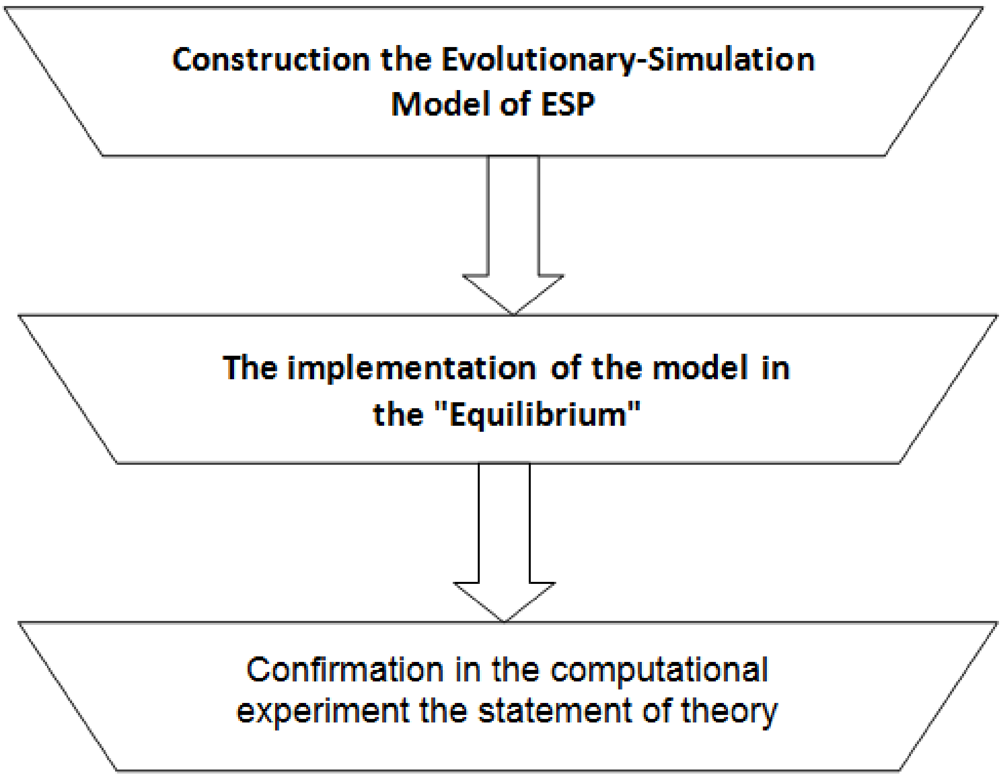

Fig. 3. Method of a conclusion of statements based on modeling and computational experiments.

Method of a conclusion of statements based on modeling and computational experiments allows we to explore a variety of specific situations, taking into account the numerous local, temporal, and other features of the real ESP. For example, Theorem 2 is strictly proved under the assumption, that the integral equation $R_1^{PM}\left(PL^{PM}\right)=R_2^{PM}\left(PL^{PM}\right)$ is solvable, and the function $PL^{PM}=\Theta^{PM}\left(U^{PM},Q^{PM}\right)$ is continuous, single-valued, defined on the whole range of values and does not have the singularities (for example, does not become infinite or no jumps). In applying the Method of a conclusion of statements based on modeling and computational experiments similar mathematical subtleties are losing value.

Modeling and computational experiments with "Decision" allows us to solve the practical problems with the account of the large number of influencing factors and complex logical relationships between them. This allows, in addition, identify the area of the truthfulness of the statements of the theory, in other words, check any changes in the external environment, when laws remain in force and under what cease to act, and obtain quantitative characteristics of the Equilibrium Stochastic Processes, taking into account all the available specifics.

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