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ECONOMIC METRONOME

The "Economic Metronome" (EM) is a term, used for the mathematical formula of a set of fundamental interrelations of key importance for the monetary-value expression among: *the main factors* of economical activity of any range; their *productivity*; *the primary proportions in production, distribution*, *exchange* and *consumption* of the output commodity product; *the speeds* of development of the activity. The formula is an attempt to design an instrument for more accurate *measurement* of the *potentially possible* and the *actually achieved* efficiency of economical activity, as well as for more reliable *forecasting* and *projecting* its further development on the investment-innovative stage.

JEL: B41; B59; C02; C62; D21; E6

1. Nature of the Problem. Theoretical and Methodological Foundation of EM

1.1. The still unsatisfactory results out of 82 years of research efforts[1] to create an algorithm and an instrument for precise measurement and prediction of the economic efficiency and dynamics are due to numerous reasons of various nature. The most important of them are philosophical, theoretical and methodological.

The rich scientific and practical experience is an evidence, that the knowledge about a certain area of the socio-economic reality can not be applied adequately for its further development, if it is described and interpreted it in some way or another. The typical scientific research requires the specific phenomena, processes and trends to be represented *in a positive way.* **Their *essential* integral** interrelations like aggregate dynamic reality, i.e. the *causal* and *objectively required* links of their *single development* in the past, present and future should be clarified and precisely formulated. The lack of sufficient knowledge on the **profound *essential*** dimensions of the measured reality makes impossible: its *adequate reflection* and *explanation*; *reliable forecast* of its further changes and development; creation of efficient *instruments* for active regulation of the changes in a more-advantageous direction and parameters. Or, behind the *specific* processes and trends in reality to reveal and by means of regulation to fulfill more completely the requirements of the *laws*, reflecting the purely theoretical type of its progressive development.[2]

It is well known, that the basic integral theoretic term "*economy*" *includes the concept* "*law*".[3] However, unlike natural sciences, whose increasing knowledge has been applied more intensively, more-productively and more largely in the public

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[1] As it is well known the first decisive step forward in solving this problem was made in 1928 by the mathematician Charles Cobb and the mathematician Paul Douglas.

[2] Law is the "*internal essential*, ...*causal*... and *sustainable* link among the phenomena, determining their *necessary* development" (Philosophic Dictionary. Sofia, 1968, pp. 184-185).

[3] Economy: from old Greek *"oikos"* – home, house, palace, homeland and "***nomos***" – law.

practice and development mainly thanks to the increasing range of newly-discovered, mathematically formulated and approved in practice natural *laws*, in economics this concept still has more nominal value, than the really cognitive value applicable in practice.

The validity of such a statement could be proven for each specific sphere of the economic theory. Here, of course, we shall try to do it only in view of the direct subject of our study – the issue (problem) on the exact nature and measurement of economic efficiency and dynamics.

1.1.1. Everyone is aware, that at the same stage *achieved*, and at and at each subsequent stage of development of the economical-organization *factors, environment* and *conditions* in the micro-, meso- and macro range the different economic subjects - individual agents or management teams, obtain *different* efficiency.[4] Under the specific economical activity of the comparatively *smallest* scale,[5] the lack of theoretical – applied instrument for *precise* measurement of the *obtained in reality* and *potentially possible efficiency and dynamics* are compensated at a practically satisfactory degree by the gained pragmatic experience and by the professional erudition of the respective economic subjects - agents, teams. In case of large-scale and especially **macro-scale** economical activity, however, the revealing, defining and measuring the **potentially higher- and highest** **efficiency**, that under the current and the expected environment **the technical and technological level of the factors of production *might* reach in practice***, but usually does not reach*,[6] has remained a big, open and unsatisfactory resolved theoretical-application problem.

Which are the key *causes* for this tough problem?

1.1.2. The efficiency and the speed of development of the economical activity even on the *smallest scale* depend on different factors and conditions. They are endogenous and exogenous; have favorable and unfavorable impact; happen *first* in the *production* stage of activity, later in *distribution*, *exchange* of commodities and in the *consumption* of each output product; they have primary, secondary, and frequently – single, even random role and weight. It is useless to demonstrate, that the *positive* potential to reach the objectively *highest* efficiency and dynamics of the economical activity, included in the **achieved** technological

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[4] It is also well-known, that the economic theory and practice provide various contents to the concept of "*efficiency*", according to the specific socio - economic *ownership*, *interests* and *objectives* of the economical activity at the respective level. Being impossible (and unnecessary) to consider the major polemic aspects and nuances of this problem, it is enough to point out here, that in this paper "*efficiency*" is used only in the *broadest, general* and *common* economic science, i.e. as an economic *result* of certain *expenses*. Or in general, this is the produced, distributed, exchanged and consumed *commodity mass* during a certain period – as a *result* of the economic *expenses* made for it, whose quantity characteristics are actually included in GDP, that has been changed in this period under current prices and specified under *fixed* prices. In such a broadest sense *efficiency* is a synonym of *productivity*, that may also result of *extensive expansion* of the activity, and of its *intensive*, *quality development*, used by us to refer to increase in *productivity*.

[5] For instance each finished and/or future investment project.

[6] And that could be defined also as *maximum, theoretical* and/or *absolute* efficiency.

and organizational level of *all* the factors and conditions, usually is not realized *completely*. It is *mainly* due to the *un*favorable *exogenous* factors and conditions, that can not be eliminated, as well as due to the *in*sufficient information provided to the economic subjects about the *forthcoming* changes in the market situation and in the more extensive business environment. Yet, if one or more subjects of a *single branch* activity in an economy achieve under the *same* input (competitive) technical-technological level a *comparatively higher* efficiency and dynamics than the others, they definitely utilize *to a higher extent the maximum possible* efficiency, *potentially* **inherent in *all* the factors and conditions**. Or the *higher* efficiency really achieved by them *approximates to the same extent* the parameters of the *maximum possible* efficiency. But it also means, that they fulfill *more - completely* the requirements of the **laws**, reflecting the pure theoretical type of the *key interrelations* and *dimensions* in this efficiency.

However in order to achieve in the future as well a ***much*** *higher real* efficiency and an approximation to the *potentially highest* efficiency, *the comparatively* most successful economic subjects (as well as all the others) need a clarity not only about the dimensions of the maximum possible efficiency, **potentially inherent in *all* the operation factors and conditions of their business**. To be able to act in a more flexible and differentiated way, they would like to know the relative *share* of *each* specific factor included as a specific potential in the *maximum possible*, in the *really achieved* and in the *forecasted* efficiency and dynamics. They also would like to know the *chronological*, *functional and causal* interrelations of the various factors and conditions of their economical activity within the *complete* reproduction cycle, i.e. in the *production*, *distribution*, *exchange*, and *consumption* stages of the generated commodity product. Such knowledge is required, because it elucidates: what is the exact **insufficiently** utilized specific *potential share* of each factor, as a *sum* and *of each of them* in the maximum cumulative efficiency; what might be the optimum *co-*proportionality of the factors, related thereto; in which directions and in which sequence, in which priority and dosage regarding each of them the future efforts, program assignments and professional skills should be mobilized. Or, to sum up, the achieved *much higher* efficiency and development, the *closer* approximation to the objectively required interrelations and dimensions at the potentially highest efficiency and dynamics, expressed by the respective *laws*, functionally depend on all the knowledge, gained by the better management.

We know however, that all the required knowledge has not been generated yet. Nevertheless it must be noted, that the knowledge has ***not*** been *searched* **actively enough**. The knowledge has been less enriched purposeful and consistently in view of revealing the nature of the corresponding *economic laws*, that might have much higher theoretical, cognitive, practical and application value.

As the required knowledge on *potentially possible* efficiency levels at the different *attained* steps and conditions of economic development have not been available throughout the entire economic history, the higher efficiency and dynamics of some companies, compared to others in the same branches has been

reached *mainly* thanks to the better utilization by the management of the *a posteriori market* information and respectively the potential of the factors and conditions, highlighted in their *practical business activity* with **the greatest weight** compared to the ultimate reproduction (cumulative -market) efficiency.

1.1.3. *The endogenous* factors and conditions have the greatest weight compared to the ultimate efficiency at the production **stage** of the specific economical activity, because: *first*, this stage is not just the beginning, but also *the foundation* of its complete reproduction cycle; *second*, without this foundation the next three stages of the cycle remain worthless, i.e. without any contribution to the cumulative market efficiency; *third*, the potential of the *key* factors and conditions at the *production* stage has a **decisive** share in gaining cumulative market efficiency; *fourth*, if the managers of a company fail to win the competitive race for a higher market efficiency **first at the** *production* stage, and later even if utilizing *completely* the potential of the specific factors and conditions at the *distribution*, *exchange* and *consumer* stages of the cycle, they would not be able to avoid the defeat of the *entire* battle for the ultimate market efficiency and competitiveness. On the contrary, if they succeed in winning the competitive battle for a higher market efficiency at the *production* stage, but without utilizing the opportunities to achieve a *comparatively* closer approximation to the *potential* ultimate efficiency and *in the other three stages* as well, the battle would be lost again. Hence follows the **substantial theoretical and methodological conclusion**, that it is logical to set the specific parameters of the **production** efficiency as a *limiting* **input basis**, *matrix and nucleus* when designing an adequate measurement model of the ultimate, complex market efficiency. In order to obtain a *complete* adequacy of the model, it *must reflect* **also** *its specific dimensions at the other three stages*, moreover – pursuant to the **objectively required coherence among the four stages** as a **dynamic equilibrium unity**.

1.2. Let's indicate with *C* **and** *V the value* costs *in the market prices*[7] for a certain period of time *t* of both *basic* factors at the *production* stage of the economical activity on a given level in the creation of a product demanded on the market at the same period of time *t*. It refers to the capital (resp. production) *costs* during *t* of the *means of production* purchased in advance in type, quantities and competitive quality and the *labor force (personnel)*. They are: depreciations, turnover funds and salaries during *t*. Let's further indicate with *M* the *value* (resp. price expression) of the *surplus* (added*)* product, generated by all the personnel of the respective company, and with *Y* – the *value* (and respectively the *price*) of the *commodity* mass produced by the company during *t*. It goes without saying, that, if the costs in value and price for *C* and *V* during *t* are utilized *completely* (100%), without any losses when generating this commodity products, this *maximum* (*potentially*) *possible* efficiency of the activity at its *production*

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[7] It is well known, that the market prices coincide with the production prices only when the production *supply* matches completely the solvent *demand*. As we shall try to reveal and to formulate this equilibrium model as an instrumental basis of measuring the *mis*balances *later*, here we assume conditionally, that the market prices and the production prices coincide.

stage could be expressed by means of the equation $Y_t = C_t + V_t + M_t$.[8] The shortest logically supporting argument is, that when the relative values of *C* and/or *V are higher* in *the practical* activity, and of *M – lower* than those in the equation, at *the respective degree* we would have *inequality*, i.e. comparative *in*efficiency.

Undoubtedly, this formula, proposed - ad hoc seems to have **static characteristics** and has a limited - predominantly analytical and partially cognitive value. However complemented by a high abstract degree, it actually reflects those *objectively required interrelations* among *the maximum possible* levels of *productive* spending during a fixed period of time of *the key factors of production*, whose *more complete* pursuit **in practice** by each company in the respective branch would result in *comparatively higher* and ***eventually highest*** dimensions of their efficiency, expressed by the ***laws*** of the **production** stage. Moreover, it would result in higher functional coherence, joint proportions, lack of crisis and equilibrium among the factors of production of the activity at its *production* stage during the period *t,* as well as among it and the functionally interrelated with it other economical activities on the meso- and macroeconomic scale. Or it would mean, that each economic subject, who succeeds thanks to his more efforts, experience and skills, to make during *t less waste and losses* of *C* and *V compared to t-1* and his competitors on the market, would *respectively* not only increase his added product and his profit. He would approximate analogically *at the same time* the practical dimensions of his corporate efficiency to the maximum possible values and productive proportions of the key factors, described in the equation $Y_t = C_t + V_t + M_t$. On the contrary, the more waste and respectively the more production costs of the means of production and labor force in the individual company during *t* for the generation of the commodity mass Y_t, the less satisfied would be the *objectively necessary* (at the corresponding technical-technological level) values and proportions compared to Y_t, measuring the maximum possible efficiency in the equation. Or it means, that each *larger **under**utilization* of *C* and *V would move away* the parameters of efficiency and dynamics *achieved in practice* from the *maximum possible ones*. Consequently the bigger would be the **in**equality, reflecting the efficiency achieved in practice. With reference to the *complete branch* (subsector, sector) of an economy, different degree of utilization of *C* **and** *V*, hidden behind the corporate prices of the same type of commodity, offered on the market by the numerous manufacturers in this branch (a routine practice in the real economic life), would be expressed in *different* corporate *quantities* and *cost*

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[8] It is not difficult to notice, that the formula, its symbolic indications, and especially the essential interpretation of the terms that have been used and will be used in the article, *completely* coincide with conceptual nature of the processes described by Smith, Ricardo and Marx in their *labor theory of value*. It is due to the fact, that in our view it remains as a theory, revealing and explaining most sufficiently *the profound* **nature** of these processes, hidden behind their *surface* (*positively*-described) **forms** of expression, i.e. the causal, objectively required (for the existence of development), functional and especially carried out in practice, interrelations among the economic factors, activities and their results. It is important to be applied in practice thanks to the above theoretical merits.

proportions among their key factors, i.e. in *respective* **inequalities**, reflecting the **un**equal corporate efficiency at their *production* stage.

1.3. Nevertheless the proposed equation does not cover explicitly *all the major* dimensions of the maximum possible, ultimate, reproduction-market efficiency of the respective economical activity. It is well known, that in the economic practice *the individual* commodity, **after** being *produced*, **immediately** passes through the next *three* stages of its reproduction cycle. When sold on the market it is *exchanged* by means of money against other commodities, required for the further /re/*production*. They are especially the newly purchased means of production, objects for personal consumption and labor force, providing for its own *reproduction* and the further *reproduction* of the entire economical activity through the follow up industrial *and* individual *consumption* thereof; the value-monetary equivalent obtained as a result of the sale is *distributed* among the direct and the indirect stakeholders in the specific political-economic process, in order to provide for *investments* for the *reproduction activity* of each of them; finally the commodity enters the stage of the production and/or its individual (personal) *consumption*. Within the *entire* corporate economical activity however **the numerous** *single* stages of production, distribution, exchange and consumption of the *individual* commodities *are carried out* within its **common commodity mass** and *step-by-step*, and *overlapping*, i.e. **simultaneously**. In the moment of *production* of the *individual* commodity A, the *already* produced commodities A (as well as the commodities B, C etc.) are *distributed*, *exchanged* and *consumed*, in order to be able *again* to be produced, distributed, exchanged and consumed. And in general under the contemporary highly developed public division of labor the four stages of the cycle of *each commodity* are usually carried out *step-by-step* – by means of the specified activity of various companies, specialized *in a certain stage*, throughout the movement of the **total commodity mass** of *all the* companies the individual stages are carried out *step-by-step*, and *simultaneously*.

Therefore from the **theoretical-methodological point of view** the proposed formula-equation, and all the previous theoretical concepts, algorithms and models of measuring the economic efficiency and dynamics, **limited** **mainly** **to the parameters** of the efficiency *at the production stage* of the respective economical activity,[9] **are unable to solve** *in a satisfactory degree* the problem of its *exact* measurement. The *adequate* algorithm and respectively the model for solving it should reflect in an *interrelated complex unity* the specific aspects and *the key* dimensions of efficiency at the *four* stages of activity – a sufficient *range*, cause-and-effect and functional *interdependence*, *step-by-step* and *simultaneous* implementation. These are the **fundamental** and the **decisive** interrelated characteristics, resp. dimensions, that should *primarily* be known and followed by each economical subject throughout his activity, in order to provide a real opportunity to achieve during *t+1* a *higher* cumulative-market *efficiency* and *dynamics* of their activity compared to *t* and/or compared to their competitors. In particular it means,

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[9] For instance the Cobb-Douglas *production function* and all of its follow-up derivative modifications.

that during *t+1* he should *produce more* productively at a *larger* scale, but at the same time to ensure – under the reproduction conditions in his control, *more*-successful utilization of the **total potential**, included in the specific factors of efficiency, resp. of the increase in his activity *at the other three stages*. Especially each economic subject should: *a)* aim through each of his initiatives at the other three stages to make at his *sale* (*exchange*) on the market of his commodities during *t+1 the least*-possible losses compared to *t* – such as products which unexpectedly turned out *unable to be sold*; *b)* **after** serving during *t* of his irrevocable liabilities to the fisk, to the social-insurance and the local administrative institutions, *to distribute* the monetary revenues from his sales in a way, ensuring him sufficient investments for *competitive* reproduction, extension and development of his activity during *t+1*; *c)* to invest by means of purchasing and inclusion in industrial and personal *consumption* in means of production, individual consumer goods and labor force according to the required types, quantities and competitive technical-technological characteristics, in order to produce commodities with market demand throughout the period *t+1* according to the required product range, quantities and useful properties.

1.3.1. As already said, that even if the management of a company has *comparatively* the best management qualities in the branch, the probability to implement in practice the maximum possible efficiency and dynamics of the corporate activity, especially for a longer period is time, is usually *much* below 100%. The main obstacle, as mentioned above, is the lack during *t* of sufficient theoretical-application *knowledge* and *information ahead of time*, providing him reliable *movement of the new fundamental changes* in the business environment and in the market *situation* during *t+1*. The changes in the business-restrictions are the most difficult to be foreseen, imposed by the *exogenous* (for the activity) factors, environment, rules and conditions, which changes during *t+1* the individual economic agent is hardly able to *predict*, and far less to manipulate for the benefit for his activity. **In his remaining free field for maneuvers and choice of more efficient decisions** he could achieve - *mainly* thanks to his professional erudition, experience and even intuition, much higher ultimate result during *t+1* compared to *t* and the competitors only when he has succeeded:

• More realistically (than his competitors) *to assess the opportunities* for carrying out, expansion and qualitative development of his business during *t+1*, within the new changes *foreseen* by him in the *exogenous* (for his company) factors, environment, rules and conditions of market, socio-political, institutional and legal nature.

• To have a more accurate insight in the expected changes in the parameters and the structural trends of the *market situation*, especially the *market demand* during *t+1*. First, they could *orient* him for the *more*-correct *prediction of the basic trends*, *market niches* and *scopes*, he could rely on for eventual **extensive** expansion and/or **intensive** development of his activity in the future.

• More rapidly, i.e. sufficiently ahead of time *t+1*, to prepare and elaborate – in view of the expected changes in the market environment and situation, the

required *complete strategy and operative programs* (*projects*) for the *main* assignments and initiatives, in order to utilize more profoundly the forecasted opportunities and niches in the forthcoming period.

The main assignments and initiatives, having the largest impact on the success of everyone, are the elaboration of **adequate *investment*** and ***innovative subprograms*** of the strategic program. They are *the first* **practical** step in identifying the most precise parameters of the forecasted *extensive* expansion and/or *intensive* development of the further activity in the form of respective investment-innovative *projects*.

1.3.2. In general the *investment-innovative* sub-programs and projects would be **adequate to a satisfactory degree**, when the manufactured commodity products during *t+1* – as a result of *extensively* expanded and/or increased *intensively* economical activity, **are sold completely on the market**, and the projected efficiency and dynamics are *higher* compared to *t* and the competitors. However such results could be obtained only when based on *realistically assessed* opportunities and niches a *realistic* estimate is made *how much* the economical activity could be *enlarged extensively* during *t+1* (if permitted by the niches) and/or *how much* it could be developed intensively (under the pressure of the competition). In other words, the proportion between the *extensive* expansion and the *intensive* development depends on the preliminary foreseen degree of pressure by the competition in the future. When the competition is weaker, the economic agents probably would prefer *respectively* **the cheaper** way for the eventual future *expansion* of their activity, resp. profits – this is the *extensive way*. When however the pressure is higher, they would be compelled *respectively* to focus on the **more expensive and less complicated** alternative – the *intensive one*. Because it requires *additional* efforts, time and investments for *innovative-R&D* activity, and when necessary – for the respective /*further*/ *education* and vocational /*re*/ or /*further*/*qualification* of the personnel.

1.3.3. Consequently **both** of the *main* opportunities and respectively instruments, available to each economic agent *within the gained added value and respectively profit*, to be able to fight successfully under the changing market environment for higher efficiency and dynamics of his activity according to the *expected* changes in the *exogenous* factors, environment and conditions, are: *a) extensive* expansion of the activity via investments in respectively increased personnel - *L* and proportionally (to *L*) larger quantity of means of production having the *current quality*; *b) intensive* development of the activity by means of respective increase in *investments*, used mainly to create and to implement the required *innovations* for *qualitative* changes in *C*, *V* and in their functional and organizational *re*construction.

If the agent, aiming at higher efficiency and dynamics succeeds economically by means of these two instruments to implement it in practice during *t+1*, it **generally** means, that **throughout** *this period, compared to t and* to his competitors, he has achieved economically **more-productive** (or respectively **more-crisis free**) fulfillment and development of his corporate activity. *Especially* it means, that he has:

• *produced* by each unit of mean production costs (for his company and for the entire branch) *larger mass* commodity products and surplus (added) value. In other words, he has utilized during *t+1* **comparatively** *higher percentage* of his **full** corporate production *potential*;

• managed to *sell* (**exchange**) the products made by the company at *comparatively least* market losses out of unsalable quantities and at insufficiently effective trade costs;

• provided through the *sale* on the market the movement of the *largest share* of the manufactured products to the real **consumption** as *useful* goods, being their final designation, having contributed to *increase respectively* the volume of production and/or the individual **consumption** of commodities in his own company and within the society at large;

• *collected* from the sales the *comparatively* highest *monetary equivalent* of the manufactured products, providing him the required investment-innovative resource for the future *simple and extended* reproduction of his corporate activity;

• managed at the **primary *distribution*** of the collected added value during *t* under current prices - M_t to keep such a *basic* **proportion**, *mainly* thanks to which: *first*, has obtained the required (according to the changes expected in *t+1*) *scale* and *extensive / intensive type of expanded* reproduction; *second*, has achieved on this basis a *larger coherence* (than the competitors) between **production supply and solvent consumer demand** of the own products throughout the entire *t+1*; *third*, has managed to obtain within the thus expanded corporate activity *the closest values* to ***its complete dynamic equilibrium development*** in the four stages;

• approximated *to the highest degree* the reproduction dimensions of the corporate efficiency to the potentially possible ones *under the **available*** technical-technological factors and conditions. Or especially, he has obtained *respectively better* dimensions and functional *co*proportion among *Y*, *C*, *V* and *M* during *t+1*, resp. *smaller* **inequalities**, reflecting his corporate /in/efficiency both at a given moment - in *static* aspect, and throughout the *entire* period - in *dynamic* dimension.

1.3.4. But nevertheless and much harder, each economic agent would be able to obtain even **the maximum possible** levels of the efficiency, utilizing **the complete** (**100%**) potential of the corporate facilities. The extremely rich global market practice has plenty examples, demonstrating , that some companies have succeeded to become not only technical-technologic leaders in their branch, but also to utilize – at least for a certain period, **the complete – 100%** potential of their facilities, and to sell all the manufactured products on the market. It means, that the highest efficiency achieved by them (with the *available* facilities) – rational, intuitively and due to favorable mix of market, social and natural situation, is actually a **complete** realization of the ***laws*** of *production*, *exchange*, *distribution* and *consumption* of the commodity goods in their **corporate** activity. Moreover, the *most favorable* values and dynamic proportions of *Y*, *C*, *V* and *M* that have been achieved in practice are not only the *objectively required and the invariant **lawful*** values and proportions. They are also a posteriori certificate in explicit form for the

implemented **full** coordination among the 4 stages of a certain economical activity and of a **complete dynamic equilibrium match** between the **production *supply*** and **solvent *demand*** of the products manufactured throughout the *entire period*.

1.3.5. The *maximum possible efficiency* and resp. the *full dynamic equilibrium* gained in practice between **production *supply*** and **solvent *demand*** are undoubtedly the cumulative ultimate result of functioning of a wide range of specific factors and conditions, of perfectly coordinated organizational-management decisions and last but not least – of the most favorable changes in the *exogenous* market situation for the companies. However a *primary basic proportion* **plays the key and proactively limiting role**. If it is revealed and observed in the *dynamic context of the single causality* of the entire economy it will have an impact on the achievement of **complete** match between **production *supply*** and **solvent *demand*,** resp. **complete dynamic equilibrium development** of each economical activity. Moreover, if it has **not** been revealed and observed in advance, such a match can **not** be achieved even if all the *other* factors, conditions and initiatives at the given level are utilized in a most – productive way and are the most favorable ones.

It refers to the **proportion of the *primary* distribution of the *surplus (added) value*** - *M*.

The economic practice makes us aware, that at the *primary* distribution of M_t a *main part* of it - $M_{1,t}$, is allocated to invest in the *expansion* of the production basis (or in general – in more means of production); and through it after a certain lag – of the production activity, followed by the **production supply**. *Another part* - $M_{2,t}$, is allocated for pro rate (to the enlarged basis) *increase* in the employed personnel (L_{t+1}) and - the *salaries* and respectively the quantity of **consumption** by the personnel in the company ($VL_{t+1}= V_t + M_{2,t}$). *A third part* - $M_{3,t}$, is invested according to the competitive pressure reported over *t* and the forecasted for *t+1* to generate and implement more *innovations* for further development of the corporate activity. The last - *fourth part* - $M_{4,t}$, is utilized to *increase* all the tax and *non*-tax deductions from the income of the company. They are transformed via the domestic and the local government budgets *mainly* in respectively larger *salaries* and **consumption** by the employees in the *non*production sphere of the entire society.

Ultimately it is not difficult to find out, that the first part ($M_{1,t}$) through the *enlarged* production basis results *only* in increase in *production supply*. Meanwhile $M_{2,t}$ and $M_{4,t}$ aim *directly* at increase in *solvent demand* and respectively in **consumption**. As far as $M_{3,t}$ is concerned, its role regarding the increase in *production supply* or in the *solvent demand* does not seem to be clearly defined. The indefiniteness is caused by the fact, that the *innovative* activity financed by this part of *M* increases, although over *too long-term period*, the quality and the productivity of the means of production, and of the labor personnel. *Just subsequently* they ultimately increase both - the *production supply*, and the *solvent demand* (resp. **consumption**). It is necessary however to specify, that at the *primary* distribution of *M* (that only matters at this stage of analysis) its part $M_{3,t}$ is

not invested *directly* in expansion of the production basis. It means, that **within one (and each) distribution – investment - innovative cycle**[10] of the *micro*economical activity, $M_{3,t}$ does not influence the *production supply*. At the *primary* distribution of *M* this part of it is directed *especially* to increase the *quality* and the remuneration, resp. the **consumption** of the labor personnel. It is specially spent for: /further/education and /further//re/qualification; corporate scientific research and innovations; implementation of the innovations in the economical activity. And much later, when the increased via $M_{3,t}$ professional skills, qualification remunerations and **consumption** by the *respective* categories of labor personnel are materialized in more created and implemented innovations for the development of the economical activity, incl. in more-productive means of production, rises ultimately (i.e. *in the next* distribution-investment-innovative cycles of the *micro*economical activity) as well as the *production supply*.

1.3.6. As soon as $M_{4,t}$ enters the budget, *a portion* thereof is invested *directly* by the state in public companies for commodities and services, as well as for infrastructure facilities of national and regional importance. Although for a *longer* period of time, this portion *directly* increases the *production supply*. But **not** the supply on *corporate* level within *the primary* distribution-investment-innovative cycle. Therefore when measuring the economic **micro**efficiency, this portion of $M_{4,t}$ should be treated as having a direct impact on the solvent micro*demand* and *consumption*, and on the *macro*scale – on the aggregate production *supply*. Consequently such a difference requires respectively to be reflected in the conceptual model on the **macro**level when further elaborated.

Consequently - **the key proportion** of the **primary** distribution of the surplus (added) value – *M*, having a *primary* and *comparatively highest* effect on the better and **complete** conformity between *production supply* and *solvent demand*, resp. of **complete** *dynamic equilibrium development* of the **corporate** economical activity, it could be presented at the first approximation by means of:

$$\mu_t = \frac{M_{1,t}}{M_{2,t} + M_{3,t} + M_{4,t}} \, .$$

The general economic essence of this initial presentation of the **key proportion** is as follows. When at the *primary* distribution of $M_{1,t}$ **a larger share** is separated than the *objectively required* (*the lawful one*), providing along the extended causal chain during *t+1* a **complete** dynamic conformity between

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[10] This cycle begins with the *primary* distribution of *M* and with saving the respective portion due for financing the *innovative* activity, passes mainly through the generation of new knowledge and innovations and ends finally with their implementation in the corporate activity as a specific factor of its higher efficiency. Although having a wider range of multiple specific activities, carried out within *a too large period of time*, specified as a term explicitly points out the impact of the causal chain of one or another alternative of the *primary* distribution of *M* on the parameters of the ultimate economic efficiency and dynamics. Consequently the term has mainly analytical and identification cognitive value.

production **supply** and *solvent* **demand**, the *production supply* during *t+1* will inevitably exceed *to a certain* extent the *solvent market demand* and the **consumption** of the specific commodity. Or such an alternative of the primary distribution will result in *the same extent* to *crisis of a relative excess production* and of **under**consumption of the specific **corporate** output. If however the amount of the sum of the elements (components) of the denominator in the key proportion ($M_{2,t}$ + $M_{3,t}$ + $M_{4,t}$) is allowed to be **higher** than the *objectively required one*, then at the *respective degree* for a certain period of time a relative **excess**consumption will occur of the *specific commodity products*, which at a later stage shall cause a relative crisis in its *production* **under**supply. Consequently it could be noted here, that the primary proportion μ_t is also the beginning of the *key* decisions in the scientific innovations and in the real practice in order to achieve the *objectively required correlation* between **production** and **consumption** of the microactivities at a certain moment and dynamically.

2. *Macro*aspects of EM, Clarifying Precisely the *Micro*aspects

2.1. It is well known from the rich global economical practice, that the **market** revenues and respectively profits of some manufacturing companies could exceed considerably the values, corresponding to their *maximum possible (potential) efficiency*, which should not have been achieved at the production stage. But as it is also known, in addition to the monopoly high prices, due to inadequate government regulation, **the main** source of *excess* incomes and *excess*profits is usually the spontaneously generated *extremely favorable* market situation for the specific corporate activity, also as a result of speculative maneuvers. Or the difference in such cases between the potentially possible and the gained *excess* incomes and *excess* profits on the market in practice is mainly due to exceeding to the same extent the *consumer demand* of the respective products above its *production supply*. It is also known however, that under similar changes in the situation, what is "a profit for one, is a loss for the other" (according to a formula of John von Neumann). Or the *direct* source of excess profits and respectively losses are not the *endogenous* factors and conditions for the companies, but the *exogenous and difficult to foresee* from the corporate level (compared to them, but *endogenous* for *macro*economy) changes in the market demand and supply – as a result of the self-regulating function of the market - price mechanism.[11] Consequently the excess profits for some economical subjects and the excess losses for others are mainly due to the **in**coherence between the commodity demand and supply, giving rise to respective deviations of the exchange prices from the product prices, i.e. prior to the distribution of some of the market incomes and profits among the companies. But it is also known, that *the larger* the market-

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[11] Therefore in most cases the *unforeseen* excess profits and excess losses on the market are considered by the respective economical subjects irrationally – as a happy gift or punishment from the Heaven – for instance by Hermes - the God of Trade (and the God of swindlers).

price deviations, *the more-ineffective* the corporate and the *complete* macro-economical activities from the point of view of the *aggregate* capital and the society. *First*, because the available production facilities in the respective companies and in general in economics are actually not completely **utilized**, *second*, because the opportunity has been missed with the available facilities to generate *all the* types and quantities of consumer goods, *potentially feasible to be produced* and *required* by the society.

On the contrary, the smaller the **dis**equilibrium and in case of zero **dis**equilibrium between market demand and supply, resp. between market and manufacturing prices in a branch (sector) and especially on the *macro*economic scale, the less *redistribution* sources for excess profits of some companies on the account of others, the *higher* the proportion of the distribution before that (through the market and by means of government macroregulation) *the aggregate* capital and labor among the specific production activities, the more-reliable, highly-organized and more–efficient will be *the overall* economy. To *the same extent* it has acquired the characteristic features of the *economic system*, as a complicated integrity and a dynamic coherence among targets and resources, expressed as an ultimate practical result, having a higher *micro*- and *macro*efficiency.

The current economical and historical practice has shown, that *objectively the required* ratios (proportionality) at each newly achieved technical-technological level of the labor forces, dynamic equilibrium and maximum efficiency of the micro- and macroeconomical activities are implemented in practice by the market-price mechanism *only in approximation*, as an *average trend*, via *continuous disproportionality*. Or, the *objectively required* proportionality, dynamic equilibrium and maximum efficiency are achieved *only partially*, by means of inevitable losses of economic resources, which are the highest in case of cyclically recurring financial economic crises.

2.2. The market mechanism is however not the only factor for a higher approximation in practice to the *objectively required macro* proportionality, dynamic equilibrium and maximum efficiency, as well as /not/ to allow a higher (than before) *dis*proportionality, *im*balance and *in*efficiency of economy, resp. */no/increase* of the *speculative* supperprofits and superlosses due to the market imbalances. Another very strong factor interacts with it and its specific efficiency/nonefficiency determines whether superprofits will be generated or not for some companies on the account of others. This is the role of the state in the organization and regulation of economy, carried out through its entire socio - economic policy.

Even when this role is restricted as much as possible (most frequently due to inadequate political delusions and decisions), the impact of its socio-economic policy on the course and the development of the economical processes in micro-, meso-, macro- and megascale remains enormous and powerful. Precisely speaking, the efficiency / *in*efficiency of **the market mechanism**, and of **the entire economy** depend on its quality and its specific efficiency / *in*efficiency. The global historical market practice has a lot of examples of countries and periods, where the

socio-economic policy of the state was not only *in*efficient, but even *disastrous* for the course and the development of the economic processes on all levels.[12] Especially when the government institution through the overall policy has allowed high budget-financial, macroeconomic and socio-political *instability*, mass civil and labor unrest, even senseless wars, the activities not only of some companies and sectors, but also of the entire economy have suffered crisis, reaching even complete paralysis. At the same time however the historical market experience has a lot of examples for *forward-looking*, *efficient* and *activating* development policy of the state. In synergic interaction with the private-market forces and interests, and especially through the iterative improvement of the market mechanisms and regulators the policy is used to recover the collapsed economy from the destruction and even to create the latest "economic wonder". Or the range of the /non/productive impact of the government policy on the economic processes and development is undoubtedly extremely wide – from **total** inadequateness, inefficiency and failure for some countries and historical periods, through /un/satisfactory results, to the highest adequateness and efficiency on *a comparative international scale*.

The choice of forms and instruments, through which the state could completely paralyze the market and economy, or on the contrary – to activate and revive them, is definitely, in the sphere of the this very popular range. First of all, the forms and instruments have different quality – with legal, institutional, administrative-bureaucratic, budget-financial, political and other characteristic features; most of them are *exogenous* for the corporate activities, but *endogenous* for the entire economy; they influence the economical processes also *indirectly – by means of* the legal framework, rules and regulators *of the market mechanism*, constituted by the state, and *directly*, side-by-side, complementing the specific potential opportunities, and most often *as a mix* – indirectly and directly; they have an impact only on individual types of stages of the economical activity, or entirely on the four reproduction stages and on the *entire* economy; they might contribute considerably to the more profound satisfaction and balancing the individual, corporate and public economic interests according to their contribution as a *share* in generating the GDP, but on the contrary as well – to oppose, challenge, damage and unbalance each other. Their quality and /in/adequateness might influence to a large extent any eventual destructive contradiction (for the development) and any dynamic unbalance between the *present* and *future* **general level** of satisfaction of all these interests, or on the contrary – the eventual achievement of a higher harmonization and dynamic

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[12] For illustration purposes it is sufficient to mention the destructive policy of the Bulgarian governments during 1990-ies, that ruined partially and completely not only the uncompetitive industries and sectors of the Bulgarian economy without any prospects, but also some competitive and perspective sectors like the military and electronic industries and the entire agri sector. As a result thereof, our economy that used to be on the average European level, is now on the "honorary" last place in the EU. Therefore such extremely important activities for the perspective development of Bulgaria's economy and society - like science, education, culture and healthcare have been brought to decay and collapse.

balancing between *their present* and *future* aggregate satisfaction, according to the achieved levels and rates of macroeconomic development.

The prevailing *indirect* forms and instruments, through which the state may block or revive the economy, are related *mainly* to the quality of the legal and the institutional-administrative framework, environment and regulators of the market-price mechanism, resp. of the market competition. No matter how more-insufficient in range and mutual coherence, more-ungrounded, lacking quality and completeness all of them may be, the more-distortedly functions the market-price mechanism and *respectively* the economical activities on the different levels are carried out with lower efficiency. On the contrary, the more-adequate in range, quality, completeness and timeliness the indirect forms and instruments of the government policy are elaborated, in conformity with the multiple requirements and dynamics of the economical processes, the more efficiently functions the market and thanks to the market – the entire economy.

Such adequateness however could be achieved mainly in the general context and interrelated with an effective enough *budget policy* of the government. Moreover, both the /in/adequateness and the specific /in/efficiency of the indicated indirect forms, and of **almost all the others** - *indirect*, *direct* and *mixed* forms of the entire government intervention in the economy, depend financially and functionally on the /in/efficiency of the budget policy. *First*, because it *limits* the resources- and the structure of all of them; it has the widest range of specific forms and instruments, influencing indirectly, directly, and mixed; it is the most-polyvalent, most-complete, most-powerful and most-representatively characterizing form for the role of the government in achieving a higher efficiency and dynamics of the economic processes on all levels; *second*, because its specific forms and levers could regulate *to a definite degree* the manner of the course of each reproduction stage of economical activity of all levels –production, /re/distribution, exchange - price, and consumption level; *third*, because its *range* in the *financial* dimension (of about 30 - 50% of GDP under the current conditions) considerably predestines the collection of superprofits by some market subjects on the account of others and *by analogy* - the **in**efficiency of the *entire* macroeconomical activity from the point of view of the *aggregate* capital and of the society;[13] *fourth*, when the accumulated fiscal resource (30 - 50%) is targeted, due to missing laws or lobbying laws, *mainly* to enrichment of certain corporate groups and persons on the account of the others and of the entire society instead of *only* to strictly expedient financing of the required adequate forms and instruments of the socio-economic policy of the government, the economic activity, productivity and dynamics on the corporate, macro- and even on megalevel begins to tend to zero.

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[13] The global market experience, especially in the first decade of the 21st century, shows, that the smaller this range and respectively the more liberalized is the market in some or more countries, under other conditions the more important are the market imbalances, the larger are the speculative profits and losses, the more inefficient is the *aggregate* capital, and hence the global and the national economies.

On the contrary, even when the /re/distributed GDP share *through the budget* is *comparatively* the largest, but its *total* quantity aims at targeted and timely elaboration of complex and quality enough lawful-institutional "rules of the market game"; to designing, programming and *co*financing (with the private capital) of the required for the micro- and macro economic efficiency and dynamics economic, infrastructure and energy resource projects on regional and national level; to harmonizing and long-term balancing of the main types of socio-economic interests, being the vehicles of the economic progress in each country, the higher the economic activity and efficiency, the more-balanced in the dynamic long-run is the development of the specific activities and of the entire macroeconomy.

Certainly, all the forms and instruments of the socio-economic policy of the government that have been applied in the economic history are well known. But for the further development and elucidation of the ideas in this paper we should highlight some of the *most-impressive* forms and instruments, thanks to which the state, especially in the leading industrial countries, manages to attain comparatively higher and the highest macroeconomic efficiency and dynamics.

In general this category covers all the "rules of the market game" influencing **indirectly** the economy, especially, the institutional – legal regulation of the statute and the functioning of the *capital, labor, commodity and currency* markets. They are their bureaucratic-organizational, business-registration, liquidation, legal-procedural etc. *conditions, regimes, mechanisms and procedures*, as well as the political initiatives of the government for /further/establishment of missing elements (institutions) and mechanisms of the state-administrative system of regulatory, institutional, labor-legal and other nature, as well as more precise regulation of the macro economic dependency and proportionality as an *active* instrument to attain a *more* balanced and a *more-effectively* functioning macroeconomic system. The *indirect* restrictions, rules and instruments for *protection, enlargement and improvement of the competition* are of the same category.

The *direct* forms and tools of the government having the most powerful effect are **the investments in projects for**: the creation and development of a *macro system* generating economic sectors, activities and services, without which the higher *macro*economic efficiency is impossible and being of no interest for the private capital; construction of more complete, more highly functional and more reliable (compared to the other states) communal, transport and communicative-information *infrastructure* on a regional and macroeconomic level according to the growing requirements of the globalizing competitiveness; carrying out indispensable *macro structural reforms* due to the unsatisfied self regulation of the *a posteriori* acting market-price mechanism; more-adequate regulation of the macroeconomic proportionality in order to achieve a *more-balanced* and a *more-effectively* functioning socio-economic system.

In the last 2-3 decades in the leading industrialized countries and especially in the USA, *its strategic* function develops with priority as the most powerful instrument of the government to achieve a higher macroeconomic efficiency and

dynamics in the long run. On the grounds of the *main trends* in the globalizing economic, energy resources, demographic, ecological and other processes outlined by the specialized authorities, the emerging major changes and challenges for the development of the national economy and society should be predicted reliably, as a basis for elaboration and application of the best possible *strategic and* tactical political-economic decisions of the government. For instance initiatives financed by the budget for: *in-time* (on each new stage) construction of the most-favorable *overall environment* for economical activity in the global-competitive reality; setting up with *priority* of *macro structure-determining* economic sectors with high returns and activities in the near future; establishment of *new transport systems*; prospecting, working out and operating *new (alternative) raw materials* and *energy resources*; development according to the changing global competitive standards of the *educational*, *scientific* and *innovative* activities, and hence – forming a *new quality of human capital* as a *decisive factor* in the present and future efficiency, competitiveness and dynamics of every economy; establishment and development of meso- and macro*innovative networks;* protection and regeneration of the environment and the recoverable natural resources, that have become *direct* prerequisites, environment, factors and conditions for more-effective and sustainable development of the economy and the society.[14]

    2.3. The current practical achievements of the economic policy of the government for crisis-free economy and respectively for higher macroeconomic proportionality, efficiency and dynamics however **are less than the *potentially possible ones***. It also refers to the highly industrialized nations, headed by the United States, having the *comparatively* most complex, active and efficient policy of the government. There are two main reasons thereto. *The first* is part of the Neoclassical Philosophy that has been dominated throughout the 20th century by the absolutization of the self-regulating role of the market in the economy, which is not of benefit for the wide public interest. *The second* (partly resulting from the first one) is due to the lack of a developed system of theoretical and application economic knowledge, satisfying the practice, including a complex and a single economic theory on the synergy dialogue role on the market and the state. It refers to a theory, capable to: adequately explain their current historical interaction in each country all over the world; allow realistic *forecasting* of the emerging main changes in the national and in the global economical-political realities; reveal the principal and country-specific most-productive forms and instruments of organizing and regulating the new economic processes via market mechanisms and socio - economic policies of the government.

    Mainly due to the lack of such a theory the unexpected Global Depression of 1929-1933, the so-called Petrol Shocks in 1973-1975, and the Global Financial-Economic Crisis since 2007 could not have been foreseen and were not foreseen.

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[14] For more details see *Balabanov, I.* Scientific-innovative policy – the most powerful modern lever of the state for competitive economic development. - Economic Studies, 2004, N 1, p. 18-26.

Due to the same reason the collapses, and the *comparatively productive* practices of the socio-economic policy of the governments in the various countries have been generated throughout the overall centuries-old market-economic history until now *mainly* on a pragmatic basis, under the trial-and-error method, largely thanks to the intuition, "art" and the talent of the respective political leaders and teams, and narrowly – on the basis of satisfactory theoretical knowledge and practical principles.

2.4. And yet the big fundamental question about this topic and the entire economic theory is: Is it possible even in the economies with the most productive government policy on the comparative global scale to reduce **considerably** the destructively-wide amplitude of the market *im*balances between demand and supply, even there, involving distorted redistribution processes and at a certain degree – not implemented potential macroeconomic proportionality and efficiency? In other words, the question is: Is it possible to attain **much higher** proportionality, dynamic equilibrium and efficiency of the micro-and macro activities compared to the historically achieved ones as a mean tendency through the market and only thanks to the well-known principle decisions and instruments of the government policy?

Definitely, an *absolutely complete* proportionality, *ideal* dynamic equilibrium of the *macro* economic system and the potentially highest *macro* efficiency are impossible to be achieved in practice even for a single moment. The main reason is that the changes in a lot of *exogenous* factors and conditions (compared to the *macro*economic reality) can not be foreseen *exactly* - mainly due to the considerable lagging behind of the aggregate theoretical and practical knowledge from the needs of the public practice. Consequently most of the available economic resources shall be inevitably wasted. Such unpredictable (so far) factors and conditions are the unpredictable natural calamities and disasters, as well as the still spontaneously occurring *external* shocks of planetary-input, of international stock exchange - financial, ecological, social, political, organizational, institutional, etc. nature.

Yet despite (and undoubtedly outside) such unavoidable losses of natural resources in the near future as well, a higher (than the available) proportionality, dynamic equilibrium and efficiency of the economical activity in micro- and macro range *could be achieved* only in case of *two* existing preconditions: *a*) current knowledge on the key parameters of the *potentially top* proportionality, dynamic equilibrium and efficiency on each stage of the development of the technological production facilities on different economic levels in an economy, as well as on the adequate methodological practical instruments, in order to observe the parameters more precisely in practice; *b*) a legitimate and efficient public body or institution should be set up for lawful application of the knowledge. *The first* condition undoubtedly requires a suitable theory and precise measurement unit for the economic efficiency and dynamics on each economic level. *The second* condition could be met only by the *respective role of the state* in the already proved capacity

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of a synergy-iterative partner of the market mechanism and especially through the *corresponding type of* **active-*strategic,* effective socio-economic policy, *corrected* permanently in a constant dialogue with the civil society**. It refers especially to specific *long-term sub-programs* of the complex *national strategy*, elaborated by each advanced industrial country, but in which the in-*time* and *targeted* development at each new stage of education, science and innovations – that used to be considered *exogenous* regarding the corporate and the macro economic activities, are becoming not only *endogenous* and *complete systematic* factors of the micro- and macrodevelopment in the future economy. They have become factor No. 1 of the efficiency and the dynamic equilibrium development of the micro- and macro economic activities.

The EM is an attempt to meet the *first* requirement.

3. Summary:

3.1. The problem of accurate measurement of the economic efficiency and dynamics can **not** be satisfactorily resolved, if its ideological and theoretical starting point, the corresponding methodological approach and the consequent conceptual methodological practical model do **not** adequately reveal, interpret and reflect:

• The epistemological diversity in the economy among *essence* and *phenomenon*, *law* and *application* of the law (essence) in practice, *objectively required* (for a development) and the spontaneous *specific* interrelations in each economical activity;

• *The precise* definition of the term and the operative figures, by means of which the economic factors, interrelations and proportions *must be* included in the conceptual model, generating *directly* and *unambiguously* the changes in the efficiency and in the dynamics of the economical activity;[15]

• **All the** *key* factors and their interrelations, having the *primary* and *decisive* effect on the efficiency and the dynamic /im/balance functioning and development of the economical activity of a certain type and range;

• The causal place and the force of the impact on the efficiency of *those main* factors, interrelations and dynamic proportions *at the **production** stage* of the reproduction economical process, playing a ***primary*** and a crucial role in view of the other *main* factors, interrelations and proportions on each stage;

• The objective *cause-and-effect sequence* and inter-relation of the economical processes, resp. of their efficiency on all levels, where the *changes in the primary causes* and *in the key* factors, conditions and proportions of the highly integrated processes play a *important* role for the /non/achievement of a higher efficiency and dynamics in the sub-localized, specific and the single ones;

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[15] In the practical *micro* range in our view they are **only** *the direct accounting* industrial and transfer costs, resp. their reciprocal proportions in the generation, distribution, marketing and consumption of the commodity products, referring **only** *for the measurement period* – depreciations, turnover funds and salaries.

- *The* efficiency *potentially possible and the achieved in practice* of each economic activity during a certain period of time, having dimensions respectively in **complete and incomplete** *dynamic-digital* equilibrium;

- *The limiting* dimensions of the *potentially possible* efficiency and dynamics for each specific economical activity and for the economy in general, being the *reference values* and *points* for the achievement in practice of a *higher-* and *highest* -possible efficiency, respectively for more complete dynamic equilibrium development of the activity on the respective level;

- *The continuous dynamics* of the economical activity and its efficiency;

- The objective relevance of the fact, that the specific factors, conditions and dimensions of the economical activity and efficiency of each type and range are generated *not completely autonomously*, but in a dynamic context and to a large extent under the influence of the factors, conditions and the parameters of the overall *macro*-economical activity as a complicated sub-structural systematic unity;

- The cascade-like systematic-structural interrelations of the factors, efficiency and dynamics of the economical activity on all levels;

- *Simultaneous, chronological*, *functional* and *unidirectional cause-and-effect* impact of the primary, secondary and even the occasional factors and conditions on the efficiency and the dynamics of the economical activity *within its complete reproduction cycle*;

- *The endogenous* and *exogenous* factors *specific* for each economical level, having different *subjects*, opportunities and instruments for *active* impact on the economic efficiency and dynamics on the respective levels;

- All types of reproduction processes – *common* and *extended* reproduction, *extensive* and *intensive* type, rooted in a higher economic *growth* and a more balanced, resp. more-dynamic economic *development*;

- All the *stages* of the *continuously* reproducing economical activity - *production*, *distribution*, *exchange* and *consumption* of the manufactured commodity product;

- The discrepancy, continuity and *no* mixture among distributive (*primary* and *limiting*) and *re*distributive (*secondary* and *follow-up*) processes;[16]

- *The permanent* transformation of *cause* into *effect* and from *effect* into *cause* of the *main key* factors and proportions in the *extended* reproduction of each economical activity, whereas the models do not allow the causes and the effects neither to be mixed, nor deleted;

- *The lawful* **measure** of the dynamic interrelations among the main factors, rates, proportions and efficiency, whose (measure) reveals the *most-important*

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[16] It means, that the effect of the *re*distributing factors, conditions and processes could be measured accurately only through **follow-up** algorhythm and instrument, that *must* be devised on the basis and within the limiting parameters of the model, covering the **primary** *distributing* processes, like the *micro* model of EM. Or, at this stage of the elaboration of the subject matter, the EM reflects *only* the **primary** distributing processes, *ignoring* the *re*distribution processes.

trends and objective restrictions of the initiatives to achieve a higher and the *highest* efficiency in the development of each economical activity;

• *The endogenous* factors and conditions for each economical level, that might be **manipulated** by respective economic subjects and by the governmental policy;

• The **key** *factors* and *instruments* that could be **manipulated**, due to which the agents of the economical activities of various range and of the governmental policy could achieve comparatively *higher-* and the highest possible efficiency and dynamics *by corresponding initiatives*. [the numerical values of these instruments remain (or might be in the operative application plan) *the only* **exogenous variables** of each adequate model, measuring the economic efficiency and dynamics.]

3.2. *In general* the **key** *factors* and *instruments* that could be **manipulated** *are the endogenous main* factors and instruments for *extensive* enlargement and *intensive* development of the economical activities of the respective levels according to the predicted changes of the market demand in the forthcoming period - *t+1*. On the **micro**level they are *the* investment and the innovative projects, resp. the *effects* expected by them for the required *extensive* enlargement and/or *intensive* development of the activity during *t+1* within the collected added value and profit during *t*. On the **macro**scale the *factors* and *instruments* **that could be manipulated**, by means of which the government policy could reach comparatively higher *macro*efficiency and dynamics, have a wider range and they are not only economic. Ultimately however and here their impact on the *micro- and macro* economic efficiency and dynamics covers three main types of governmental initiatives, projects and instruments for: *a) extensive* enlargement of the entire *macro*economic activity; *b)* its *intensive* development; *c) macro*structural reforms and changes, enabling the government to increase the relative share of perspective sectors and activities with high returns. They result in higher general *macro*economic efficiency and dynamics, being always more than the *summed up micro*efficiency and dynamics.

The philosophy and the methodology of discovering and measuring the effect on the *macro*-economic efficiency and dynamics of the three groups of initiatives and instruments are the same in principle, like on the *micro*level. Their interpreting, arguing and reflecting in a **macro**model is a further theoretical, practical and specific methodological assignment of a large scale, but the place here is scarce. Moreover the theoretical deriving and constructing the EM *macromodel*; the step-by-step reflection therein of the effect of the factors and interrelations on the efficiency in the *secondary*, and later on in the next redistribution processes, following the *primary one* in the companies; the setting up of a system of submodels, reflecting the objective interdependence and influence among the highest integral *macro-* and lower aggregated dimensions of the efficiency in the sectors, subsectors and in the companies; empirical check of the *macro*model and finally its application in the political and economic practice as a reliable instrument for measurement and projecting the *macro* economic efficiency and dynamics, is actually a large multifaceted project. It

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requires *corresponding* resources, institutions and infrastructure. Its successful implementation is related to numerous specific activities in clarifying, exactly formulating and step-by-step solving a *wide range of macro*problems of cognitive, methodological-application, *macro*system - structural, informational, statistical, legal, institutional and (last but not least) political nature. Their elucidation and solving as a *single* theoretical - application assignment requires *macroholistic*, technological, step-by-step and iterative methodological approach. It could be applied successfully only by complex enough and respectively specialized research, application-expert, financial and institutional- organization resources, not available for us. The mobilization of such resources, the organization and management of the implementation of the remaining large-scale assignment are within the potential opportunities and prerogatives only of the state.

From the overall work on this large project the authors of EM could elaborate only its **fundamental** *part*, at a later stage of course – theoretical deriving, backed with arguments and quantitative interpreting the **basic** *input formula* of the *macro*model of EM. On the one part, it is a follow-up of the concept and the mathematical development of the *micro*model. On the other part – its derivation is the mean stage for the further logical elucidation and formalization of the effect on the macroeconomic efficiency and dynamics of the main factors and interrelations in a macrorange, following the analogical ones in a microrange.[17] On the third part, the macroformula is a theoretical and a mathematical foundation for the further adequate outlining, programming and implementing of the remaining major assignment for the further development of the system of submodels of the *macrometronome*, according to an empiric check-up and its application in в practice.

Again due to shortage of place in this publication the analytical position of the author can not be presented on the achieved and not achieved aspects in the economic science (economics) in solving the theoretical problems of the offered theories for far. As far as the last ones are concerned, whether they have something new and useful, the highly-qualified professional reader is granted the complete freedom for merciless criticism.

4. The Mathematical Formula of EM in *Micro*range

In order to satisfy the above-mentioned principal requirements within the *micro*range we begin with the first formal entry of the basic integral interrelations among the *main* factors, proportions and productivity of the *corporate* economical activity:

(1) $Y_t = C_t + V_t + M_t.$[18]

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[17] This effect is a function of the secondary /re/distribution process of GDP, carried out in the fiscal-/re/distribution system of the state budget and is the source of financing the socio-economic policy of the state. In practice the power of such impact in a certain period depends on the politically determined relative *range* of the secondary /re/distribution process (i.e. on the financing scope of the state policy) and on the quality of the specific political-economic measures for this period.

[18] The economic indications and the explanation of the items of the equation are specified in p. 1.2.

It should be pointed out in advance, that this general input formula implicitly includes, similarly to the genome in biology, all the integral characteristics and dimensions of the *potentially possible* economic efficiency and dynamics. The main theoretical proof is, that in view of Y_t the values of C_t and V_t **objectively** *may not be lower*, and the values of M_t - *higher* within the **primary** *distribution process*. Or it means, that they express their objective extreme minimums and respectively the maximum at each moment of *t* and throughout the *t*-period.

Later we shall derive *explicitly* step-by-step in *operative-application* form the dimensions, allowing, *first*, to verify the final EM *micro*model (empirical check), *second*, to be used for more accurate measurement and prediction of the microeconomic efficiency and dynamics.

4.1. The *productivity of one worker* in a company for a *certain* time *t* shall be expressed by:

(2) $Y_t* = C_t* + V_t* + M_t*$,

And of *all* workers (L_t) with:

(3) $Y_t = L_t Y_t*$.

For the discrete time *t* we enter: $t = 0, 1, 2, \ldots, k,$ where 0 is the starting time for measurement of efficiency, $t = 1$ is the *total* I period (such as 1 year) after 0 etc.

As mentioned in p. 3.5., at the *initial distribution of the created during t* added value - M_t, *its first part* - $M_{1,t}$, is reinvested in the *enlargement* of the production facilities - C_{t+1}; *another part* - $M_{2,t}$, is spent on *increase in the* labor personnel (L_{t+1}) (in proportion to the extended facilities) and – in their *salaries* – V_{t+1}. (as explained in p. 3.5, there shall be added also the *third part* - $M_{3,t}$, generally invested in increasing the *quality* and respectively the *salaries of the innovative R&D personnel*, and hence – in generating and introducing more *innovations* for further development of the corporate activity); *the forth* - $M_{4,t}$, is utilized for *increasing* the tax and *non*-tax deductions from the revenues of the company. Or:

(4) $M_t = M_{1,t} + M_{2,t} + M_{3,t} + M_{4,t}$. Respectively:

(5) $C_{t+1} = C_t + M_{1,t}$ and

(6) $V_{t+1} = V_t + M_{2,t} + M_{3,t} + M_{4,t}$.

We indicate the four *parts* of M_t by means of the coefficients: $\alpha_t, \beta_t, \gamma_t, \varepsilon_t$, where:

(7) $M_{1,t} = \alpha_t M_t;$ $M_{2,t} = \beta_t M_t;$ $M_{3,t} = \gamma_t M_t;$ $M_{4,t} = \varepsilon_t M_t$ and respectively:

(8) $\alpha_t + \beta_t + \gamma_t + \varepsilon_t = 1$.

We replace (5), (6), (7) and (8) в (1) and after some calculations, we obtain the relation:

(9) $Y_{t+1} = Y_t + M_{t+1}.$

Increasing by r_t during *t+1* of the added value M_{t+1} as a result of *extensive enlargement* and/or *intensive development* of the corporate activity it could be expressed by:

(10) $M_{t+1} = (1 + r_t)M_t.$

Replacing (10) in (9) results in:

(11) $Y_{t+1} = Y_t + (1 + r_t)M_t.$

(10) and (11) enable us to derive the relation between Y_{t+1} and Y_{t-k}. It is:

(12) $Y_{t+1} = Y_{t-k} + M_{t-k}\left\{(1 + r_{t-k}) + \sum_{i=1}^{k}\left[(1 + r_{t-k+i})\prod_{l=0}^{i-1}(1 + r_{t-k+l})\right]\right\},$

And in (12) the following short terms for sum and product have been introduced:

$$\sum_{i=1}^{k}[a_i] = a_1 + a_2 + \cdots + a_{k-1} + a_k; \prod_{l=0}^{t-1}[b_l] = b_0 b_1 \cdots b_{t-2} b_{t-1}.$$

The Formula (12) reflects the output product in one period, compared to another random period. If we intend explicitly to link the one period with another, we should insert in (12) $k = t - 1$. We obtain:

(13) $Y_{t+1} = Y_1 + M_1\left\{(1 + r_1) + \sum_{i=1}^{t-1}\left[(1 + r_{i+1})\prod_{l=0}^{i-1}(1 + r_{l+1})\right]\right\}.$

In order to link the output product during a period with the initial conditions, in the beginning of the production process (i.e. at *t=0*), in (13) we should replace:

$Y_1 = C_1 + V_1 + M_1;$

$C_1 = C_0 + M_{1,0};$

(14)

$M_1 = (1 + r_0)M_0 = (1 + r_0)(M_{1,0} + M_{2,0} + M_{3,0} + M_{4,0});$

$V_1 = V_0 + M_{2,0} + M_{3,0} + M_{4,0}.$

Replacing (14) in (13) results in:

$Y_{t+1} = C_0 + V_0 + M_{1,0} + M_{2,0} + M_{3,0} + M_{4,0} +$

(15)

$(1 + r_0)(M_{1,0} + M_{2,0} + M_{3,0} + M_{4,0})\left\{(1 + r_1) + \sum_{i=1}^{t-1}\left[(1 + r_{i+1})\prod_{l=0}^{i-1}(1 + r_{l+1})\right]\right\}.$

Likewise expressions for C_{t+1} and V_{t+1} could be obtained.

We start with

(16) $C_{t+1} = C_t + M_{1,t} = C_t + \alpha_t M_t.$

The formula (11) is used for M_t. The conclusion is similar to the conclusion for Y_{t+1}. On the grounds of (16) we derive the following *recurrent* formula:

$$(17) \quad C_{t+1} = C_{t-k} + M_{t-k}\left\{\alpha_{t-k} + \sum_{i=1}^{k}\left[\alpha_{t-k+i}\prod_{l=0}^{i-1}(1+r_{t-k+l})\right]\right\}.$$

In (17) stating that *k=t-1*, we obtain the correlation between the capital at a certain period of time and the capital at $t = 1$

$$(18) \quad C_{t+1} = C_1 + M_1\left\{\alpha_1 + \sum_{i=1}^{t-1}\left[\alpha_{i+1}\prod_{l=0}^{i-1}(1+r_{l+1})\right]\right\}.$$

In (17) using (14) we could link the measured capital at each time interval with the measured capital in the initial moment.

A similar expression will be obtained for V_{t+1}. We start with:

$$(19) \quad V_{t+1} = V_t + M_{2,t} + M_{3,t} + M_{4,t} = V_t + (\beta_t + \gamma_t + \varepsilon_t)M_t.$$

In (19), returning back in time, we derive *the recurrent* correlation on the analogy of the conclusion of *Y_{t+1}*. The result for the link between *V_{t+1}* and an unspecified moment *V_{t-k}* from the past is:

$$(20) \quad V_{t+1} = V_{t-k} + M_{t-k}\left\{(\beta_{t-k} + \gamma_{t-k} + \varepsilon_{t-k}) + \sum_{i=1}^{k}\left[(\beta_{t-k+i} + \gamma_{t-k+i} + \varepsilon_{t-k+i})\prod_{l=0}^{i-1}(1+r_{t-k+l})\right]\right\}.$$

In (20), stating that *k=t-1*, we obtain the correlation:

$$(21) \quad V_{t+1} = V_1 + M_1\left\{(\beta_1 + \gamma_1 + \varepsilon_1) + \sum_{i=1}^{t-1}\left[(\beta_{i+1} + \gamma_{i+1} + \varepsilon_{i+1})\prod_{l=0}^{i-1}(1+r_{l+1})\right]\right\}.$$

Hence in (14) we connect further V_{t+1} with the initial conditions.

4.2. In *t+1* the number of workers is L_{t+1}, and the average labor productivity of one worker is - Y^*_{t+1}.

Consequently

$$(22) \quad Y_{t+1} = L_{t+1}Y^*_{t+1}.$$

Using the main formula (13), we obtain 2 new formulas:

$$(23) \quad Y^*_{t+1} = \frac{1}{L_{t+1}}\left\{Y_1 + M_1\left\{(1+r_1) + \sum_{i=1}^{t-1}\left[(1+r_{i+1})\prod_{l=0}^{i-1}(1+r_{l+1})\right]\right\}\right\} \quad \text{and}$$

$$(24) \quad L_{t+1} = \frac{1}{Y^*_{t+1}}\left\{Y_1 + M_1\left\{(1+r_1) + \sum_{i=1}^{t-1}\left[(1+r_{i+1})\prod_{l=0}^{i-1}(1+r_{l+1})\right]\right\}\right\}.$$

The effect on the efficiency and the dynamics of the *key proportion* of *the primary distribution* of M (see p. 1.3.6) should be *explicitly* included and reflected. [It influences the unique (lawful, resp. reference) *dynamic* parameters of the model, oriented for respectively more efficient pursuit in practice of the dynamic equilibrium in a period/s/ between *production **supply*** and *solvent **demand***]:

(25) $\quad \mu_t = \dfrac{M_{1,t}}{M_{2,t} + M_{3,t} + M_{4,t}} = \dfrac{\alpha_t}{\beta_t + \gamma_t + \varepsilon_t}$.

Therefore we should derive two useful proportions. We begin with:

(26) $\quad \alpha_t + \beta_t + \gamma_t + \varepsilon_t = 1$

And with some transformation the proportions are obtained:

(27) $\quad \mu_t = \dfrac{\alpha_t}{1 - \alpha_t}$;

(28) $\quad \varepsilon_t = \dfrac{1}{\mu_t + 1} - (\beta_t + \gamma_t)$.

Hence, in order to obtain formulas in the influence of μ_t, we should replace (27) and (28) in the main proportions. The replacement of (27) in (18) results in the following impact of μ_t on *C*:

(29) $\quad C_{t+1} = C_1 + M_1 \left\{ \dfrac{\mu_1}{1 + \mu_1} + \sum_{i=1}^{t-1} \left[\dfrac{\mu_{i+1}}{1 + \mu_{i+1}} \prod_{l=0}^{i-1} (1 + r_{l+1}) \right] \right\}$.

Replacing (28) in (21) also results in a formula for the impact of μ_t on *V*:

(30) $\quad V_{t+1} = V_1 + M_1 \left\{ \dfrac{1}{\mu_1 + 1} + \sum_{i=1}^{t-1} \left[\left(\dfrac{1}{\mu_{i+1} + 1} \right) \prod_{l=0}^{i-1} (1 + r_{l+1}) \right] \right\}$.

In (10) on M_{t+1} we obtain:

(31) $\quad M_{t+1} = M_1 \prod_{i=1}^{t} (1 + r_i)$.

In (29), (30) and (31) the mutual cause-and-effect and effect-and-cause dynamic interrelations of the changes in the main factors and proportions in EM from the parameters μ_i and r_i occur in explicit form. Thus we could derive the

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next and *final* formula (32) of the **Economic Metronome**, the parameters of which are in full dynamic equilibrium (from theoretical point of view). It could be checked by replacing the general real numbers with specific, which is omitted here. Or:

$$Y_{t+1} = C_{t+1} + V_{t+1} + M_{t+1} = C_1 + M_1 \left\{ \frac{\mu_1}{1+\mu_1} + \sum_{i=1}^{t-1} \frac{\mu_{i+1}}{1+\mu_{i+1}} \prod_{l=0}^{i-1} (1+r_{l+1}) \right\} +$$

$$(32) \quad V_1 + M_1 \left\{ \frac{1}{\mu_1 + 1} + \sum_{i=1}^{t-1} \left(\frac{1}{\mu_{i+1}+1} \right) \prod_{l=0}^{i-1} (1+r_{l+1}) \right\} + M_1 \prod_{i=1}^{t} (1+r_i) =$$

$$C_1 + V_1 + M_1 \left\{ 1 + \sum_{i=1}^{t-1} \prod_{l=0}^{i-1} (1+r_{l+1}) \right\}.$$

4.3. The technological steps for the practical **measurement** by means of EM of the *achieved* efficiency and dynamics (for instance during *t+1* compared to *t*) are:

a) We replace in (32) Y_{t+1} with the product *actually* manufactured and *sold* on the market during *t+1* in terms of prices;

b) We calculate through the formulas (29), (30) and (31) the *potentially possible* (under the *achieved* working technical-technological conditions of the corporate activity) quantities of the production and the transaction costs - C_{t+1} and V_{t+1}, and of M_{t+1} respectively. Such quantities would be realized only if *the maximum possible* efficiency and dynamics were reached during the period, i.e. without any economic losses at *each unit* of really manufactured and sold product on the market expressed in value and price;

c) We compare the *potentially possible* quantities of the production costs and of the added value, i.e. of C_{t+1}, V_{t+1} and respectively of M_{t+1}, with *the actually* made costs and with *the actually* collected market revenues *above* the aggregate costs. (The corporate accounting deals with them – but not in aggregate form);

d) The differences between the potentially possible and *the really made* production expenses and revenues in excess of the expenditures - C_{t+1}, V_{t+1} and M_{t+1}, outline the *main trends* and *the numeric limits of the reserves for* efficiency and dynamics, that might have been reached during *t+1*. They are the most important benchmarks for the corporate policy regarding the efficiency.

4.4. It is more difficult to improve through EM the **predicted** activity of the economic efficiency and dynamics for a forthcoming period, such as - *t+2*. It consists of consecutive steps as follows:

a) According to the market opportunities and niches *predicted* actually by the economic agents about *extensive enlargement* and/or *intensive development* of the corporate activity during *t+2,* on this basis we calculate *the expected total* (*cumulative*) **effect** of the respective investment-innovative projects for *t+2* in the market-price quantity;

b) We enter it in the EM formula by means of M_{t+1} and r_i;

c) We calculate the aggregate *correlation* among the values of *all* the capital corporate assets by means of *C* and *V*, current and specific part thereof are the production costs during *t+1*, i.e. of C_{t+1} and *V~t+1~*. [This correlation is due to the *achieved* (and increasing in the future) level of the working technical-technological conditions of the corporate activity and at each stage **determines** the relative quantity of *the key proportion* of *the primary* distribution of *M~t~* - μ_i, i.e. of

$$\frac{M_{1,t}}{M_{2,t} + M_{3,t} + M_{4,t}}.$$ (Consequently it refers **only to the specific stage** of

technical-technological development.) Or in general, it is the proportion of distribution of *M~t~* between the investment opportunities for the further increase, on the one part, of the production facilities and respectively of the production **supply**, and on the other part – of the solvent **demand**];

d) We enter in EM the relative number of the key proportion μ_i (which, again, provides the *dynamic* match *at a certain stage* between the *production **supply*** and the *solvent **demand***);

e) We calculate the *potentially possible* aggregate quantities of $Y_{t+1}, C_{t+1}, V_{t+1}$ and of M_{t+1};

f) We compare them with the *real entries by the* agents in **all** (i.e. as a *cumulative* quantity) investment innovative projects during *t+2*. The differences show the *main **guidelines*** and *the possible **stages*** for further reduction of the costs regarding the aggregates C_{t+1} and V_{t+1}, as well as for *respective* increase in $M_{t+1,}$ or the differences are *potential (not discovered in advance) reserves* in numeric expressions, that *might be achieved* by the corporate *management* in the forthcoming period, in order to obtain *higher* efficiency and dynamics than those entered in such projects in practice.

Such reserves could be discovered in advance by the EM thanks to the heuristic and correction function of the model for ***more-realistic** prediction* and *designing* the economic efficiency and dynamics of the corporate activity in the short run. This option is ensured by the fact, that both the potential, and the actual dimension of *each* basic factor of the economic efficiency and dynamics is derived out of the others through the prism of their compulsory dynamic equilibrium unity, incorporated in the *Economic Metronome*.

29.IX.2010