

FORECASTING PROBLEMS FOR ECONOMIC MACROPARAMETERS

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Abstract: The article deals with problems of forecasting of economic macroparameters on the basis of the principle of «subjective multideterminism», i.e. an expert account of maximal amount of interrelated «objective» and «subjective» causes. A description is given of the system of support of decision-making in forecasting the level of inflation and gross domestic product on the basis of the tree solution method.

Keywords: Tree solution method; index of inflation; gross domestic product.

Introduction

[Voloshyn, 2006] offers the technology of forecasting (by applying the system of high-quality forecasting on the basis of multiparameter dependences represented by a solution tree, [Voloshyn, 2005]) - realizing conception of «subjective multideterminism (in [Voloshyn, 2006] - «plural subjective determinism»». In the basis of this conception the effect is determined by a multitude of interdependent causes (objective and subjective, in particular, by activity of a subject, which, in its turn, is determined by his opportunities, will, desires, preferences, etc.). Such approach is by no means an original one - similar views were expressed, in particular, by the Nobel laureate V.V. Leontief («To the issue of pluralistic interpretation of history and problem of inter-disciplinary co-operation», Harvard, 1948), who made an attempt to develop his own methodology of «understanding of history», - «neither economic nor anthropological nor, say, a geographical analysis can, at the modern stage of development of the corresponding sciences, bring to a solely correct assertion». Certainly, as V.V. Leontief notes with irony, it will be much simpler when all sciences have merged into a certain unified field of knowledge. But as «the golden age» of science has not yet come, it is necessary to develop methods of «inter-disciplinary co-operation». V.V. Leontief suggests that several experts should be involved simultaneously in independent explanation (forecasting) of this or that phenomenon, whereupon «the project manager» must compare the results of their analyses to produce a certain maximally complete and objective research. In [Voloshyn, 2006] an approach like that is interpreted as «subjectivization of objectivity» and another step is suggested – «objectivization of subjectivity» (taking into account psychosomatic features of the experts). And the most important, if in 1948 it was possible only to declare such «pluralistic method of forecasting», the present-day development of computing engineering, mathematical methods (in particular, the approaches known under the common name of the «artificial intelligence»), sociology, psychology, etc. allows to a great extent to realize this approach ([Voloshyn, 1999, 2001, 2003, 2005]).

[Voloshyn, 2002, 2003] offer a description of instruments for creating applied systems of support of decision-making in various fields such as, for example, forecasting of economic parameters [Voloshyn, 1999, 2003], medical diagnostics [Voloshyn, 2005]. [Voloshyn, 2006], as an example, quotes the preliminary results of using the instruments created for forecasting the index of inflation in Ukraine. The said work deals with the problem of forecasting of macroeconomic parameters, in particular, the index of inflation and the gross domestic product on the basis of the instruments described in [Voloshyn, 2005, 2006].

Instruments for creating applied systems of forecasting

[Voloshyn, Pykhotnyk, 1999], [Voloshin, Panchenko, 2001], [Voloshyn, Panchenko, 2002], [Voloshin, Panchenko, 2003], [Voloshyn, 2005], [Voloshyn, Holovnia, 2005], most of which were presented at the KDS conferences, develop the conception of «high-quality forecasting on the basis of the multiparameter dependences represented by the solution tree» [Voloshyn, Panchenko, 2002]. It is considered that the effect is determined by a multitude of interdependent causes the degree of influence of which on the cause is determined «subjectively» (by expert measuring). The more parameters «forming» the effect, the better (for adequacy of the model), however, this makes the analysis of the model more complicated (there is the «curse of dimension», which must be overcome [Voloshyn, Panchenko, 2002], in particular, using also methods of artificial intelligence).

The construction of an applied system of support of decision-making is reduced to highlighting by experts of problems and subproblems (tops of the tree) and links between them (arcs of the tree). Experts determine the weights (probabilities) of transitions between tops. It is acceptable to get unclear expert estimations achieved by the Boolean variables described by the values of function of belonging (by vectors of the real numbers from 0 to 1). Every expert sets three estimations – optimistic, realistic and pessimistic, the scaling of which is effected taking into account the psychological type of the expert. The type is determined on the basis of psychological tests built into the system. Such psychological tests help to determine the coefficients of «veracity», «independence», «caution», etc.

The tree is built on the basis of collective estimations of experts using the method of pair comparisons. The construction of a resulting tree requires the use of the algebraic methods of treatment of expert information, and the Hemming metrics and measure of lacks of coincidence of grades of objects is used as distance between ranges. A resulting tree is determined as the Kemeny-Snella median or as a compromise [Voloshyn, 2005]. In the case of setting priorities in an unclear form the elements of matrix are set through the functions of belonging.

The algorithms of successive analysis of variants [Voloshyn, Panchenko, 2002] allowing to process trees with hundred tops are offered for determining optimum ways within the tree.

The solution tree is set by tables. Every table is a separate level of the tree, every line of the table is a separate top at this level. Every element of the line is the probability with which a transition is possible from this top to the top of a lower level. These probabilities are set by the functions of belonging, being vectors of the real numbers from 0 to 1 of any length. A table is filled through questioning of experts. The existent functions allow to add columns, lines, to set a dictionary (which allows to put verbal estimations of an expert in accordance with the probability, by way of setting certain levels), save tables in a file, read tables from a file.

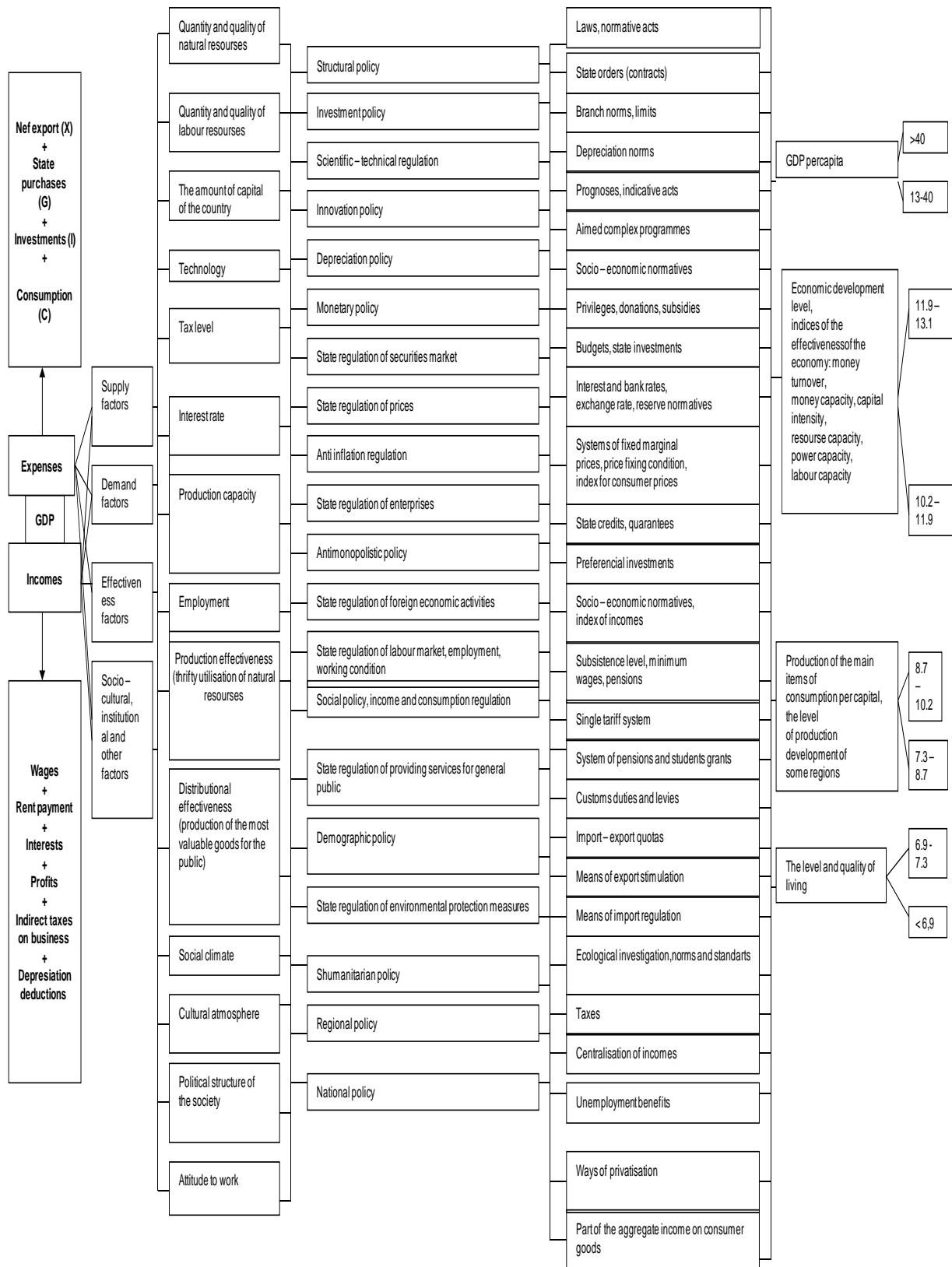
An expert way helps to set matrices that are the result of comparison of variants of tops which can be included into a tree. On the basis of analysis of the matrices tops are determined to be included in a tree as well as probabilities of transition into them from the tops of a higher level. If a solution tree is decomposed into a number of subtrees which have identical leaves, first the probabilities of these leaves in each of them are calculated, and then probabilities for the whole tree are determined.

Forecasting the index of inflation

The index of inflation is one of the basic macroeconomic parameters reflecting the main trends of economic development. No universal and perfect approaches to solving the problem of its forecasting exist today. The methods of quantitative forecasting (timing rows, regressive analysis, imitation modeling, etc.) based on the "continuation of the past" give bad results at forecasting of the "unstable" processes, characterized by the "violation of monotony", based on the saltatory changes not typical for development of the process in the past]. The problem lies in representing the future which cannot be interpreted as the ordinary continuation of the past, as the future can take totally new shapes in principle. Such forecasting ("high-quality forecasting") is based on the idea of direct use of a man's (expert's) knowledge. Thus, above all things, it is necessary to take into account the "unclearness" of the expert information which in its turn depends on his professional and psychological features (competence, independence, objectivity, realism, inclination to risk, etc). Therefore any forecasting of the index of inflation is effected using the instruments described in the previous chapter. A fragment of a solution tree for forecasting of the index of inflation is represented below.

In order to forecast the index of inflation the following basic subproblems are selected:

- The economic situation - the state of industry, the state of the agro-industrial complex, the state of the financial market, trade, etc.;
- The political situation – the share of the shadow economy, the investment, currency, antimonopoly policy, etc.;
- The socially-demographic situation - unemployment, socially-demographic pressure, growth rate of population, etc.;
- The financial situation - financial-budgetary, currency policy, government control of the equity market, government control of prices, etc.



The value of the index of inflation in Ukraine for 2005 that was forecast in June, 2005, made up 12,8%. In the budget of Ukraine this index amounted to 9,8%, the official statistics on the results of the year 2005 gives it as 10,5%, and international organizations assess it as 12,5-13,0%. As we see it, the high accuracy of our forecast is achieved owing to the «objective» reason – taking into account of large number of heterogeneous interrelated causes influencing the result. The second reason, in the authors' opinion, is «subjective», i.e. a «narrowly specialized» expert estimation, an expert frequently is not aware of what he forecasts in the final analysis. The forecast of the index of inflation value for 01.01.2008, received in April, 2007, made up 17,3%. It is interesting to note that the National bank of Ukraine forecasts inflation in Ukraine in the current year at the level of 7%, the government – 8%, President of Ukraine pronounced in March, 2007 the level of inflation of 11-12%. It only remains to wait for KDS-2008 and compare the forecasts!

Determination the gross domestic product index

As is generally known, the GDP index may be determined by three basic methods: by the created products (the production method); by the costs (the method of the final consumption); by the profits (the distributive method).

The first two methods are basically used in most countries. The choice of one method or another is determined by the availability of a reliable data base. Under the present conditions in Ukraine there is no «reliable data base», one can speak not so much about accuracy of statistical information, as about its «complete inaccuracy» (and, frequently, about its absence). One of the main factors «distorting» the statistics is the shadow sector of the economy. Its «integral» expert estimation (from 40% to 60%) is too inaccurate to be used in the GDP calculations. The way out is in applying the principle of «indirect calculation», using (after V.V. Leontief) the method of «inter-disciplinary co-operation» according to which long chains of events are naturally divided into groups of the directly linked events; each of them is studied and is explained separately, the type of explanation will change in transition from one group of links to another; purely «economic» interpretation may prove most suitable for one group of events, purely «political» or «social» for another.

For the purpose of estimation (the GDP forecasting) the maximal possible number of groups-factors («subproblems», «subtrees» in solution tree) were determined that influence directly or indirectly the GDP value. Thereupon, in subtrees the maximum possible amount of tops was singled out that may potentially determine the given group of factors. While making an expert decision on including each particular top into a subtree, we took into account, in particular, availability (accuracy, authenticity, possibility of receipt) of evaluation of this factor.

The following groups of factors and factors in a group were taken into account:

1. The real sector (expenses by the categories of expenses, expenses of households on the final consumption, the final consumption of the general state administration sector, individual final consumption, collective final consumption, gross fixed assets accumulation, change of stocks of the material and technical facilities, export of goods and services, import of goods and services, index of industrial production, employment, unemployment, average wages, consumer price index, price index of producers);
2. Budgetary-tax sector (operations of the general state administration sector, i.e. the summary balance, operations of the central organs of state administration, like the summary balance, financing due to outsourcings, due to internal sources, by bank institutions, non-banking institutions, income from privatization of state property, national and guaranteed by the state internal debt, government internal liabilities on the initial terms of settlement, short-term government internal liabilities (within 1 year), medium-term and long-term government internal liabilities, state securities, credits, debt obligations guaranteed by the government of Ukraine, loans of international financial organizations, official loans);
3. The financial sector (analytical accounts of the bank sector as of the end of the period, amount of money, internal credit, requirements to the government, requirements to other sectors, net external assets, analytical accounts of the central bank, as of the end of the period, monetary base, net requirements to the government, obligations before the government, requirements to the banks, requirements to other sectors, external assets, external liabilities, interest rates, the National Bank of Ukraine, the current bank rate, actual rate by the instruments, banks of Ukraine as to the credits allotted at the bank market in the national currency, rate by the attracted deposits in the national currency, rate by the given credits in the national currency).
4. The external sector (the balance of payments as of the end of the period, the account of current operations, the balance of goods and services, profits, current transfers, the account of operations with capital, the financial

account, investments from Ukraine (direct + portfolio + other), investments into Ukraine (direct + portfolio + other), errors and omissions, international reserves as of the end of the period, reserves in foreign currency, reserve position in the IMF, special rights of borrowing, gold, other reserve assets, foreign commodity trade, gross external debt as of the end of the period, the rate of exchange of a US dollar to an euro, annual average).

5. Social conditions for the population (average size of monthly pension, average size of monthly wages, state help to families with children, the labor-market, economic activity of the population, registered labor-market, unemployment, demographic situation, quantity of the population, natural movement of the population, migratory movement of the population, education, preschool establishments, vocational educational establishments, higher educational establishments).

The GDP estimates for the 1st quarter of 2007 amounted to 150 billion UAH, the official statistics (taking into account expert estimation of the shadow sector) is 10% lower. This fact can be interpreted as an error of the «integral official» expert estimation. It is interestingly to note, that the forecast GDP values for the year 2006 estimated in May-June, 2006, gave the same 10% divergence with the official estimation of the State Committee on Statistics. Undoubtedly, there is no question here of the accuracy of our forecast to the «true» value (merely for the lack of the latter. It would be interesting to conduct a research using the «true» data (but for one sector) for «training» the system i.e. for determining reliable values of interaction of the factors.

Conclusion

The name and contents of the KDS conference fully corresponds to the principle of the «subjective multideterminism» used in forecasting of economic macroparameters:

KNOWLEDGE (of experts in different branches of science and practice), - DIALOG (between them, with the help of experts on decision-making and artificial intelligence), - SOLUTION (of problems of humanity).

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