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THE ACHIEVEMENTS AND SHORTCOMINGS FORECASTING THE DEVELOPMENT OF ECONOMIC PROCESSES**

We shall discuss here economic forecast which is a statement relating to a definite future, formulated using the results of scientific research verified empirically, and although not wholly certain, nevertheless acceptable.

The development of econometric forecasting is closely connected with the development of economic theory, especially macro-economics, statistics, methods of classical econometrics, spatial econometrics, systems theory, decision theory, availability and quality of statistical data and data processing techniques, and, in particular, computerization of numerical calculations.

The importance of forecasting research has always been significant. In western countries such research is among the most important in economics. In conditions of a market economy its importance increased even further. Economics, management, finance, banking, accounting, insurance and mar-

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He is the author of over 150 academic works, inlcuding nine important books and several articles published in Poland and abroad. The subject matter of the Processor's research involve the theory and application of statistics, econometrics, spatial econometrics, forecasting, and multidimensional statistical analysis.

The Professor conferred 14 candidates for a doctor's degree, was a tutor of 3 habilitation thesis and also reviewed 47 PhD dissertations, 28 habilitation disertations, 14 applications for a professorial title, and several monographs and articles.

Among his duties there are also those concerning the organization of research. He was a member of the Main Council for Higher Education (Rada Główna Szkolnictwa Wyższego) and the Chairman of its Economics Section, and prorector of the Kraków University of Economics. The Professor is Head of the Committee for Statistics and Econometrics in the Polish Academy of Science (PAN); a member of the Central Commission for Academic Degrees and Titles, and a member of editorial boards of several academic publications.

His significant achievements in the development of statistics and econometrics and the role played by him in organizing research as well as his constant and productive cooperation with the Wrocław University of Economics have resulted in conferring on him in Wrocław the title of Doctor *Honoris Causa* in 1996.

** Text of the lecture given during the ceremony of awarding the doctorate *honoris causa* in the Wrocław University of Economics, on November 26, 1996.

keting became the practical disciplines where forecasting is of particular importance. Therefore it is not surprising that the subject 'Forecasting Theory' has been included in the curriculum of economic studies.

At present, the issues of economic forecasting is in the spotlight due to the interest of politicians, economists and the media. It attracts the attention and interest of the most prominent economists. The approaching millennium is creating a demand for various forecasts and other ways of looking into the future – hence the recent popularity for the *Old Testament* and the *Book of Psalms* as a source of prophecies.

We have systematically published variant forecasts for several countries, especially well-developed countries, as a decision-making aid for economists, corporations and government agencies. However to be able to make rational decisions and stimulate the development of the economic phenomena which interests us, one has above all to possess the ability to forsee the developments of such processes. In order that the results of forecasting studies could be used directly as the basis of policies mapping out the development of the economy and aiding the decision-making process, the process of constructing economic forecasts should be based on solid, constant and verified methodology.

Such forecasts are being prepared everywhere in the world by individuals, teams, companies, banks, insurance societies, corporations and government agencies and institutions. At the same time there is however growing scepticism towards the possibilities of long-term economic forecasts. The demand for economic forecasts in several branches of regional industry is enormous. People are concerned with several questions – for example, will agricultural production cover the needs of a growing population? How far will environmental pollution increase? Which fuels will be in short supply? Will inflation systematically fall in the nearest future? What will be the population numbers and age structure during the next years? Can Poland feed over 80 million people given the existing soil and climatic conditions? Will the shortage of organic fuels mean that the 21st century becomes the age of nuclear energy? Will the average growth of GNP in ten associate member states of the EU fall below 5% in 1996/97? Will the surfing on Internet become as habit-forming as drinking, smoking and gambling? Will the successful initiatives of the European year of fighting racism and xenophobia be continued after 1997? Will our planet be subject to global disaster? Is an apocalypse inevitable? All these questions are important and we would like to answer them accurately and know effective methods to make accurate forecasts.

Many prominent scientists and institutions are involved in forecasting the future. Several forecasts based on science have been made under the auspices of the Rome Club and the UN. They have used new disciplines: econometrics, spatial econometrics, taxonometrics, system dynamics, operational research

and economic informatics. Several international conferences have been organized by the Forecasting Committee 'Poland in the 2lst Century' in the Polish Academy of Sciences, The World Futures Studies Federation, The 21st Century Foundation, the International Institute of Forecasters, the Institute of Econometrics and Statistics in Łódź University, and the Department of Forecasting Theory in the Kraków University of Economics, where various methods of forecasting and their results have been discussed. One has to add here that the forecasts made by various institutions differ significantly.

What are the reasons for such a situation? To construct an accurate forecast, for example the state of an economic object, one has to be familiar with its history and environment and on the other hand know also the relations between the class of chosen variables which describe the object and its environment. The history of such objects and their conditions at the moment of making a forecast are usually fairly well-known. There is an enormous amount of statistical data describing the phenomena and economic processes in more precise ways than ever before. The weakness of forecasting is a result of inadequate knowledge about the relationships between economic variables. The lack of knowledge concerning laws ruling economic phenomena, unlike the laws of nature which are precise and well-researched, forces the scientists to resort to substitutes of such laws like econometric models, which have become immensely popular in recent decades. The role of scientific laws is played here by multi-directional relations between variables, described by econometric models. These relations are however approximate.

In developed western countries with a stable economy, the construction of econometric models is technically difficult, but satisfactory as they can be built on the basis of long economic time series, usually showing slow but permanent growing trends thus often yielding good indications. Our situation is different. The time series are irregular and show profound changes. We cannot show trends which are linear, exponential, logistical or loglogistical; the series are short because the changes in the political situation effect the rules of the economy and legal and financial regulations. The changes in the economic rules destroy the comparability of numerical data. In such conditions it is obvious that constructing forecasting models is a difficult, risky and unrewarding task.

The possibilities of predicting the future seems doubtful for many people. Experience tells us that there have been several forecasts which have come true, but also many which have failed. One could list several examples of mistaken forecasts. In the 70s and 80s Alvin Toffler in his works Future Shock and The Third Wave promised a new, fascinating and fantastic future world which was not a straightforward continuation of existing trends. The Rome Reports made obvious the impossibility of such a continuation – they didn't however suggest

any real alternatives. More and more it turns out that our faith in rationality and purposefulness teleology is nothing more than faith. Another overoptimistic example was the forecast of sales of CD-ROM encyclopedias. Market research showed an enormous interest in this product, however when the multi-media encyclopedia was launched on the market, only a few of the potential buyers actually purchased it. One should accept without being too surprised that the forecasts of some economic phenomena turned out to be biased by small mistakes, others by much larger errors.

The difficulty of forecasting in the economy also stems from the fact that the economic object are neither totally controllable nor independent. This applies to both companies and national economies and world regions.

As we have already mentioned, the forecasting of the main economic indicators like growth, size and structure of employment, inflation, the trade of balance, the stock market and currency rates, interest rates, the capital market, sales, financial turnover and economic risk, are the basic aims of building formalized economic models. Econometric models are mainly appraised on the basis of their prognostic capabilities (capabilities of describing the researched phenomena in the future). In practise, generally one concentrates on the problem of constructing a 'good' model which describes a given economic phenomenon using past data. It is then enough to extrapolate and to obtain a successful forecast. Such a practise does not take under consideration the fact that past models may not work in the future. It can turn out that the model which is 'better' according to the accepted criteria can give a forecast which is less accurate than the 'worse' model. There is also a direct problem of stability or instability of the model. The stability of an econometric model means generally the constancy of its analytical form, set of explanatory variables and the value of its parameters. The stability of a model means here that it describes equally well given variable in different time intervals. The subject literature offers several statistical tests which enable verification of model's stability in the past. However, frequently we are unable to examine the stability of the model because be the scarcity of data. In practise, this means that demanding stability of models with respect to certain periods in the past can lead to difficulties in economic forecasting. The theory of econometric forecasting requires that a model will be stable in the future, such stability is a condition *sine qua non* of correct forecasting. The stability of a model with respect to the period under study does not allow us to assess its stability in the future. The lack of such stability is a reason for frequent major inaccuracies of the forecast. There is a widespread practise of examining stability with respect to the period under study and, it such exists, assuming that it will occur in the future. It is not always the case. Conforming the stability in the future remains beyond our empirical possibilities.

The condition of stability was formulated in relation to econometric model. However for the success of the forecast there should be above all stability in the environment of the forecast variable. Asserting such stability is impossible because the environment cannot be constant. One should stress therefore that there is no connection between stability within the examined period and the existence of such stability in the future. The existence of such a relationship, which underlies of economic forecasting theory, is accepted only because of practical concerns. Practise however, does not justify such generalizations.

The implications of our discourse is not the rejection of traditional methods of econometric forecasting. Their application should be aided by complementary disciplines.

One should also consider the forecasting methods which are based on the principle of regular progress of economic phenomena in time. This comes down to approximation of time series with a certain 'smooth', trend function, for example, linear, exponential, power, logistic and extrapolation of that function beyond the observed interval of variability of the forecast variable. It is a fairly convenient approach but it can be criticized for several reasons; the most important of which is that the economic time series generally do not subscribe to the hypothesis of 'smooth' development of such phenomena in time.

Because of that, recent years have seen many so-called non-classical forecasting procedures, which are generally characterized by removing the classic assumptions of regularity in the development of phenomena in time as a necessary condition of forecasting. Such solutions went, above all, in the direction of constructing moving averages models which are to serve only short-term applicability. Their prediction is decided by their relatively fast adaptability to undergoing changes in development trends. Therefore forecasts based on them will be biased with relatively small error. Because of that this new class of models is being described as the class of adaptiv models. Such models do not assume a priori the stability of analytical shape of the trend function nor of its parameters in a given time interval. Constructing a forecast based on these models assumes that the progress of economic phenomenon in time can be segmented. That is 'smooth' only in certain time intervals. It seems that such models have particular importance for short-term economic forecasts.

There is immense interest regarding the long-term forecasting the phenomena of large inertia – that is with slow qualitative changes. The main reason for such interest is the list of current problems connected with energy (it is said for example that around the year 2000 we could have a lot of energy coming from new sources and in 2015 compact nuclear power stations for industry), environment and food. At present we have to point out the growing threat posed by the demographic explosion, especially in third-world countries, the

waste connected with military expenditure, famine, pollution, increasing conflicts between the poor and rich regions of the world, the decline of the environment and unchecked development. Therefore long-term projection is indispensable despite the uncertainty of results in the long term. Although such projections have failed in many cases, as with the rate of population growth or the levels of environment pollution etc., they did result however in a breakthrough concerning the way of thinking about the limits of human expansion which seemed unstoppable due to developments in science and technology.

Among the long-term forecasts the biggest impact was made by the reports of the Rome Club (its membership does not exceed 100 people but they represent as many as 53 countries). The first report was prepared in 1972 by a group be scientists from MIT (Massachusetts Institute of Technology) and was entitled *The Limits of Growth*. Its authors were first to describe the growing threat of a demographic explosion. They predicted the exhaustion of energy sources; total pollution of water; lack of drinkable water and food. Since 1972 there have been 18 reports for the Rome Club prepared. They covered different issues, from economic to climatic and biological. The most recent, called *The First Global Revolution. How to Survive?* is linked to the first one. Its writers, A. King and B. Schneider, are convinced that at present we are at an early point of creating a new type of world society. It will be as different from the present as the agricultural was from the industrial one. This change follows the present geo-political and economic changes.

Among the popular forecasts are those self-realizing and self-destructive ones. For example, announcing the forecast of price increases can lead to the buying out of goods and result in the increase of prices which would not have happened without it. On the other hand publication of forecasts relating to the production of pork led to the decline of the hog cycle. In this case we are dealing with a phenomenon of the forecast effecting the predicted event, known as the Oedipus effect.

We have only touched on these issues and not entirely covered the subject. We have left out the methods of predicting economic events of a qualitative nature such as social and economic development, standards and quality of life, based on the methods of spatial econometrics, taxonometrics and methods of statistical comparative analysis. These phenomena cannot be expressed using only one variable as it is impossible to measure them directly. Summary characteristics of complex phenomena are usually prepared using the so-called synthetic (aggregate) variables. Replacing the class of several variables describing the examined complex phenomenon with a synthetic variable can decrease the number of these variables and make it easier to estimate the parameters of the model by eliminating collinearity, facilitate the choice of analytical shape of the model and in some cases can also significantly reduce

the number of equations of the model. We have also left out non-mathematical (heuristic) methods of forecasting based on expert opinions based on wide and solid forecasting knowledge, intuition, imagination, experience and common sense. Predicting the future is not in this case the extrapolation of past irregularities but forecasting possible variants in the development of phenomena which interest us and pointing out the most realistic ones. These methods, based on the assumption that the accuracy of collective judgement is higher then of the individual one are used in long-term forecasting of new scientific discoveries, developments of science and technology and also in predicting the changes of existing regularities. We have also left out interesting methods based on the principle that the development of one economic object (company, branch of industry, commune, province or county) will be analogical to another which has already reached that level (method of historical analogies). They depart from extrapolation of regularities describing the past of the particular phenomenon and instead assume common development patterns in certain phenomena. The most difficult methodological issue here is defining similarities in these phenomena. We have also left out methods of forecasting company sales, economic phenomena described by discrete variables. Forecasting the progress of such phenomena uses among others, Markov's chains, neuronal networks, logit and logarithmic models. These methods are potentially employed in marketing, financial market research, or broadly described economic diagnostics. The issues connected with forecasting economic phenomena are very complex and technically difficult but bring a lot of satisfaction. We can observe several varied approaches to the same problems and often as a result of applying different methods we obtain different forecasts. In such cases, there is a need to appraise the quality of these forecasts obtained by different methods. Depending on the researched phenomenon, the kind of statistical data, ease of use, and costs, we try to find a method which brings the most accurate results.

It is necessary to stress the fact that the economic laws are more complex than the laws of physics and therefore constitute a weaker basis for forecast. Economic phenomena are far more complex than physical ones. They are effected by so many variables that it is impossible to identify the role and importance or each of them and because of that they cannot be experimented on – that is observed in artificial conditions where only chosen variables apply.

The increase of demand for economic and warning forecasts leads to the thought that the nearest future will see the creation of an integrated forecasting system whose task will be to signal unfavourable developments.

Before that happens the following conditions have to be fulfilled:

1. Further refinement in the methods and techniques of forecasting,

2. Improving the methodology of managing the economy, particular branches of industry and companies,

3. Training specialists in forecasting methods,

4. Obtaining a suitable number of well-programmed computers,

5. Organizing an information system serving the needs of warning forecasts, containing among others databases and banks of forecasts produced for various economic phenomena.

Therefore further intensive educating of personnel and the necessity to speed up work on the bank of warning forecasts and information system available to all those involved in forecasting is at present an urgent task and a condition to the correct functioning of a Polish forecasting system. It will mean boosting activities leading to realizing a forecast when it predicts a positive outcome and counteracting it when it is unfavourable.

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