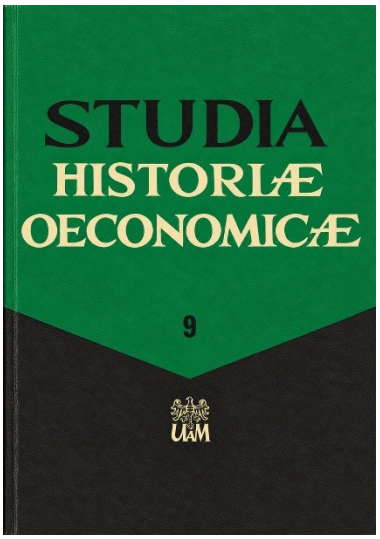


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QUANTITATIVE CONCRETIZATION IN THE MODEL METHOD IN ECONOMIC HISTORY

I

It will be useful, for the sake of our further analysis, to introduce a distinction between traditional and new quantification in economic history. The main difference concerns the conceptual framework of study and not the methods and techniques of processing quantitative data although in traditional quantification they are usually simpler. New quantification forms an element of a consciously used model method (associated always with a theory) while in the traditional procedure quantitative data are regarded as a statistical extension of historical description and sometimes explanation. That is the reason for proposing a distinction between mere quantification and quantitative concretization — the latter treated synonymously with the new quantification.

What is the quantitative concretization? In order to answer this question we have to ask first: what is a model in economic history? Model is, one can say, a set of statements (sometimes in a form of mathematical equations) pertaining to a given (studied) fragment of Past Economic Reality (PER) but not of a real fragment of PER only the fragment of PER after depriving it of certain properties of neglect, oversight, or "suspension" of certain parts of our knowledge about PER. Through this idealization procedure we are able to study in more comprehensive manner the structures of which PER consists and their changes over time. Since these structures (see section II of this paper) are quantifiable, partially quantifiable, and unquantifiable and since they pertain either to human actions with their motivations or to historical processes one can distinguish (taking into consideration only these distinctions) many types of models (idealization procedures).

In building models one should refer to the knowledge of real PER and, at the same time, to an adequate theory. Sometimes we use theories from other disciplines (economy, sociology, social psychology). Usually historians, however, adapt existing theories or propose new ones. Only in such a way we can obtain realistic (i.e. isomorphic with PER) models, the only ones, in our opinion, which an economic historian can fruitfully apply to his study. Realistic does not signify factual. All models are counterfactual because they are idealizational images of PER.

There is, however, a difference in their counterfactual character. According

to the part of our knowledge of PER we are "suspending" (with the use of our theory) two types of models are distinguishable (from a purely methodological point of view) in economic history. In the first (M_1) we suspend only less important features of the analysed fragment of PER leaving the model the "substantial" ones; in the second (M_2) the elimination concerns more important features, such as the existence of railroads or Southern Slavery in the nineteenth century America. M_1 aims at producing more comprehensive and more intelligible descriptions of PER, and at explaining or assessing the relative effects of different variables (supply, demand, the introduction of new machinery, etc.). M_2 is a tool which permits the measurement of the relative importance of a given factor (as for example, railroads), the existence of which was suspended in the model. The model remains, however, realistic (and this should be underscored because of existing misinterpretations) as long as its theoretical assumptions and the knowledge about PER are adequate.

Building a model is only the first step in the model method. The very heart of that method is the concretization procedure, or experimentations on the model. There are, as we know, different possible types of concretization. In each case when we deal with quantifiable or partially quantifiable structures the only adequate is quantitative concretization. Here we have to do with a methodological necessity and not with a subjective conviction concerning the role of quantification in economic history.

Quantitative concretization (as a part of the model method) is not necessarily new in economic history. One of the most elaborate and early examples of quantitative concretization connected with a consciously used model method is the work of J. Rutkowski (1938) in which he constructed the model of income distribution in the manorial-serf economy system and then (after computing data concerning several thousand of villages and manors) filled out the model with these data[1]. A similar procedure can be traced in P. Deane's and W. A. Cole's book on the British economic growth 1688 - 1959[2]. On a very large scale the quantitative concretization (as a part of the model method) has been proposed by the American school of "new economic history"[3], which uses it for explaining and finding otherwise unobtainable data.

If we make a distinction between models which are formulated in quantitative terms but which at the same time can be quantifiable or partially quantifiable (M_3) and those which use the language of mathematics, so-called econom-

[1] J. Rutkowski, *Badania nad podziałem dochodów w Polsce w czasach nowożytnych* (Studies on the division of the national income in Poland in the Early Modern Epoch), vol. 1, Kraków 1938.

[2] P. Deane and W. A. Cole, *British Economic Growth 1688 - 1959. Trends and Structure*, sec. ed. Cambridge at the University Press 1969.

[3] See: *The Reinterpretation of American Economic History*, ed. by R. W. Fogel and S. L. Engerman, Harper and Row. New York, Evanston, San Francisco, London 1971.

etric models (M_4), the quantitative concretization procedure could be summarized as follows. In the case of M_3 quantitative concretization consists of finding out the quantitative data and applying them (in several steps) to the model. M_4, as is known, assumes a general form:

$$Y=f(X_1, \ldots, X_n)+e,$$

where Y is the variable to be explained and f stands for the function of explanatory variables $X_1, \ldots, X_n$ and e represents all the factors contributing to changes of Y which are not included explicite into the model[4]. The quantitative procedure will appear as a quantification of $X_1, \ldots, X_n$ (first step) and of e (next steps). Both steps can differ greatly with respect to concretization procedure since the concretization of e should encompass also different kinds of qualitative concretization. The essence of the procedure is in both cases (M_3 and M_4) the same.

Sometimes we begin our study by concretizing $X_1, \ldots, X_n$ only qualitatively hoping, however, to quantify it in the future. H. Van der Wee writes that "the elaboration of a theoretical image in symbols and equations is not sufficient for going more deeply in the problem studied. Hypothesis ought to be verified on the basis of reality with the aid of quantitative sources and with the help of econometric techniques"[5].

All kinds of concretizations can be regarded as a process of eliminating idealizing assumptions or, in other words, as a process of getting the model "closer" to unsimplified reality (PER). This aspect reveals the dual character of concretization procedure: concretization of the model and its simultaneous verification. In the economy the best confirmation of the model is such a concretization which enables predictions concerning real economic actions and processes. In economic history we do not make such predictions. Instead, the scientific value of concretization is judged by comparing the logical consequences of the (concretized) model with the body of already accepted knowledge concerning PER. Such comparisons should be dynamic and could lead (and very often do) to changes in already accepted knowledge.

But not all the models can be submitted to the concretization procedure (in the sense accepted here); it can be successfully applied only to realistic models which are constructed on the basis of an adequate knowledge of reality and adequate theory. Models which do not fulfil these requirements we can call instrumentalistic ones. They can be consciously instrumentalistic (as in the case of M. Weber's ideal types) or de facto instrumentalistic as a result of applying unadequate theory or insufficient historical knowledge. J. Marczewski's

[4] Z. Pawłowski, *Ekonometria* (Econometry), Warszawa 1966, p, 38; L. Nowak, *Model ekonomiczny* (Economic Model), Warszawa 1972, p. 118 - 119.

[5] H. Van der Wee, T. Peeters, *Un modèle économique de croissance interséculaire du commerce mondiale (XII^e - XVIII^e siècles)*, Annales ESC, 1, 1970, p. 121.

launching of the so called "quantitative history"[6] is a good example of the latter. The starting point here is not the observation of PER and "suspending" of certain of its features but an a priori construction of a set of equations showing some relations and connections between economic categories derived from economic theory. They are only tools which help to classify some economic data in an a priori fixed manner without taking into consideration the real structure of reality. But one can always discuss whether a model uses a sound theory and sufficiently rich and good knowledge of reality. Models used by economic historians can be found between two opposite poles which could be called instrumentalistic and realistic approaches. Only concretization procedure can provide us with the possibility in which place of that continuum can be found the model actually used in our study and whether we are really coming closer to PER, or, whether it is really possible with our model. Concretization is an endless process. "In my opinion, writes F. Braudel, studies must lead from reality to the model and conversely from the model to reality through a continuous and limitless process of correction and recorrection"[7].

II

One could ask what we mean by quantifiable, unquantifiable and partially quantifiable structures i. e. where are the limits of the quantitative concretization. Using some basic notions borrowed from mathematical set theory one could say that:

$$\mathrm{PER}=\langle \mathrm{U};\ \mathrm{R}_1, \ldots, \mathrm{R}_n,\ \mathrm{Q}_1, \ldots, \mathrm{Q}_n,\ \mathrm{NQ}_1, \ldots, \mathrm{NQ}_n,\ \mathrm{PQ}_1, \ldots, \mathrm{PQ}_n \rangle ,$$

where U stands for a set of objects which the economic historians are interested in, and $\mathrm{R}_1, \ldots, \mathrm{R}_n$ different (more or less complex) relations and systems of relations taking place among objects belonging to U (such as relation of equality, causal relation, prices, economic growth etc.). Other symbol stands for some subsets of set U which we shall explain later.

Let us ask whether both U and $\mathrm{R}_1, \ldots, \mathrm{R}_n$ are quantifiable, that is, whether PER could be submitted to measurement. We understand measurement as ascribing numbers (taken from a given set of numbers) to objects belonging to U and which are in one way or another mutually related. From this point of view it is not difficult to distinguish two kinds of relations or structures among objects belonging to PER[8]. These are qualitative ($\mathrm{NQ}_1, \ldots, \mathrm{NQ}_n$) and quantitative ($\mathrm{Q}_1, \ldots, \mathrm{Q}_n$) structures. In the case of qualitative structures the set of numbers we use in measurement is limited only to 1 and 0 (an object

[6] J. Marczewski, *Introduction à l'histoire quantitative*, Paris 1965.

[7] F. Braudel, *Ecrit sur l'histoire*, Paris 1969, p. 72.

[8] The notion of economic structure is used by L. Nowak, *Model ekonomiczny...*, p. 31 - 59, 196 - 202.

of a given kind does exist or not) while in the case of quantitative structures a set of numbers which we could ascribe to our objects is normally much richer. A simple example will illustrate our idea. Let us analyse these simple factographic statements:

(1) X was Y's son;
(2) X was an outstanding inventor;
(3) X was a sick man;
(4) X was a rich man;
(5) X left $ 500 000 to his children.

In the case of (1) the relation of being Y's son divides U dichotomically into two subsets: X and the rest of U (U—X) so this is a purely qualitative structure (is impossible to be someone's son in a "certain degree") which we could ascribe only numbers 1 (Y's son) and 0 (other objects). It could seem at first glance that also the cases (2), (3) and (4) belong to the category of qualitative structures but in fact they are (more or less) quantifiable and it is obvious that by quantifying them we are enlarging our cognizance of PER. To quantify (4) we would have to assign to the notion of "rich man" the level of his income and wealth; if we possess adequate evidence (including comparative information) it would be a simple process. In the case of (2) and (3) the procedure of quantification would be more complicated since we would have to measure the "intensity" of a given feature, in this case outstanding inventor and sick man. This would involve "preparing" our structures for quantification by modelling them through such tools as scales, indexes, etc. In both cases, however, we obtain only a partial quantification ($PQ_1, \ldots, P_n$). There remains some unquantifiable residuum in "outstanding" and "sick". But still we can count "outstanding" inventors, "sick" men etc. because they are usually more or less numerous in PER.

Let us turn now to the explanatory statements. Are they quantifiable? The situation here is similar to that of (2), (3), (4). The causal relation as such is qualitative, but one can often compute the "intensity" of different factors (supply, demand, technological innovation etc.) responsible for a given effect (economic growth, productivity, etc.). It is obvious that precise measurement (which of course very often requires different mathematical methods, facilitates the reconstruction of PER. Let us examine following statements:

(6) The rise of cereal prices (in a given place and time) has been caused by a bad harvest and the increase of the population;
(7) The development of the manorial-serf economy in Eastern Europe in the sixteenth century was a consequence of growing Western demand for grain and of Eastern European nobility's strong political position;
(8) X decided to invest $ 100 000 in agriculture.

Of these case (6) is most quantifiable (involving merely a computation of supply and demand), while case (7) is partially adapted to numerical processing since we can measure demand. In both cases, however, quantification does not reach all aspects of the vast field of human motivations. This is especially visible in case (8) in which X's decision-making seems unquantifiable. But even here, if we assume X's rationality, we could quantity certain factors, such as profits connected with different alternative investments, thus making X's action more intelligible.

With case (8) we touch upon characteristic of PER other than distinction between quantifiable and unquantifiable structures. PER can also be presented as follows:

$$\mathrm{PER}=\langle U; a_1, \ldots, a_n, P_1, \ldots, P_n, R_1, \ldots, R_n\rangle,$$

where U is already known as a set of objects which the economic historians are interested in, $a_1, \ldots, a_n$ stand for individual and group actions, $P_1, \ldots, P_n$ for historical processes (such as economic growth, capital mobility, decline of feudalism etc.) and $R_1, \ldots, R_n$ relations joining elements from $a_1, \ldots, a_n$ with the elements from $P_1, \ldots, P_n$. It is obvious that historical processes can be regarded as (to as great extent) the unpurposeful results of purposeful human actions and that these processes form the conditions for human actions. If we admit that explanation of PER is the main task in economic history, the best procedure to accomplish that task should aim at combining the explanation of both parts of PER — human actions and historical processes, the latter expressed in other terms than human actions. One can say intuitively that $P_1, \ldots, P_n$ are more susceptible to quantification (i. e. that among $P_1, \ldots, P_n$ is more of $Q_1, \ldots, Q_n$, and $PQ_1, \ldots, PQ_n$ than among $a_1, \ldots, a_n$). And since in economic history (especially among the more ambitious schools and historians aiming at producing more total reconstruction of the economic life) the rule is to explain processes by processes (which are more susceptible to quantification) one is tempted to formulate a postulate of passing over the narrower field of economic history and analysing such phenomena as mentality, cultural change, modes of life and class statutes. New forms of quantification are developing (largely through the contribution of the American "new economic history"), while new (not traditional) qualitative study in economic history (i. e. qualitative concretization) still waits for its great "spurt".