

*Janusz Leszek Wywiat\**

**SELECTED SCIENTIFIC WORKS OF  
ZBIGNIEW PAWŁOWSKI ON THE OCCASION  
OF THE 80th ANNIVERSARY OF HIS BIRTHDAY**

Professor Zbigniew Maria Pawłowski lived in the years 1930–1981. His scientific career began in the Central School of Planning and Statistics (at present the Warsaw School of Economics) in Warsaw, where he first studied and then began working as a deputy assistant in the Statistics Department. There he obtained the doctor's degree in 1957, and in 1962 – a postdoctoral degree (then referred to as that of an assistant professor of economics). Since 1962 he continued his career in the Higher School of Economics (later renamed the University of Economics) in Katowice, where he took the position of the head of the Department of Statistics. In the year 1957 he received the title of an associate professor and in 1972 – of professor ordinarius.

In the environment of Polish econometricians, mathematicians and statisticians the opinion prevails that Professor Zbigniew Pawłowski was one of the pioneers of econometrics in Poland. He was very active not merely in the field of science but in the organisational one as well. He was a co-organiser of numerous scientific conferences, including the well-known conference of the departments of statistics of the Katowice, Kraków and Wrocław higher schools of economics. That conference has been organised every year since then. He taught many future scientists and was an eminent scientist himself. He was a member of the editorial staff of several publishing houses. Many of his personal scientific successes for ever became a part of the methods of statistical inferring. They have inspired several young research workers. Numerous examples of his successes in this field can be quoted. Here we are going to present some selected examples of these achievements.

Thanks of Zbigniew Pawłowski lectures on econometrics and mathematical statistics were introduced in Polish faculties of economics or management. He underline that statistical inference is necessary while building econometric models.

---

\* Professor, Department of Statistics, Katowice University of Economics.

He wrote about statistical methods in a simple and reader-friendly manner, which encouraged people to study econometrics and statistics. Many of his academic handbooks were published many times and some were translated into Russian, Hungarian and German. He was generally recognised as a man of learning in the sphere of econometrics. His knowledge was far from superficial as Zbigniew Pawłowski dealt with a lot of detailed questions of econometrics and statistics. That was reflected in his academic lectures as well as in scientific articles and monographs. There we can find several interesting analyses and original ideas which are definitely worth being refreshed after years. He dealt mostly with econometrics, forecasting, mathematical statistics and survey sampling. His works on each of these spheres alternated in time.

Many of Zbigniew Pawłowski's works refer to mathematical statistics, and among them there are the following handbooks: *Introduction to Mathematical Statistics* (in Polish, 1965, 1966 and 1969), This handbook was translated into Russian and Germany in 1967 and 1971, respectively. His next textbook on statistical inference was: *Mathematical Statistics* (in Polish 1976, 1980). One of Zbigniew Pawłowski's most interesting proposals, whose description can be found in the papers (1973, 1974) is to use a statistical test in order to verify the hypothesis on the occurrence of autocorrelation in a time sequence. It is worth underlining that this test may be used for a simultaneous verification of the hypothesis about the occurrence of autocorrelation of the first degree or of higher degrees. Z. Pawłowski (1959) proposed some test for normality based on Geary's well-known theory of mean independencies and of variance of a sample from a normal scatter. Besides, in this article he did something rare, that is he estimated the power of a test of agreement by means of analytic formulae. It is well-known that such a thing is usually done by means of a computer simulation.

Zbigniew Pawłowski also realised the need to develop inferring on the basis of non-simple samples, the effect of which is a handbook to study survey sampling *Introduction to Survey Sampling* (1972). Z. Pawłowski (1963, 1965a) presented the practical applications of the survey sampling methods. Let us note that in the light of the latest trends in statistics, we can notice that some problems of econometrics can be adopted to predicting the characteristics of finite populations; that refers e.g. to total tax revenues or total agricultural output. A model approach is widely used in the problem of one division referred to as small area sampling. Small area sampling has been developing dynamically in recent years. Besides, in repeated (and conducted with the use of so-called rotary samples) researches of population models some autocorrelations are used. The achievements in the field of econometrics, including Zbigniew Pawłowski's ones, are then very useful in survey sampling. Moreover, close to survey sam-

pling are some problems related to statistical quality control. In this field Z. Pawłowski (1959a) analysed the usefulness of statistical inference.

Zbigniew Pawłowski devoted many scientific works to constructing, estimating and using in practice some econometric models. About this he wrote dozens of scientific articles and handbooks or scientific monographs. Among them the most famous was: *Econometrics* (1969, 1972, 1975, 1978, 1980) which was translated into Hungarian in (1970). Moreover, his book *Econometric Models of Consumer Demand* (1961, 1971) is treated as the first monograph in Poland presented the econometric models. The use of econometric models to aid production management was dealt with in his book *Econometric Analysis of Production Process* (1971, 1976). In this field the Pawłowski's (1970a) well known achievement remains modelling the influence of so-called organisational effect on, among others, productivity.

Z. Pawłowski discussed the practical uses of econometric models of macroeconomic phenomena when he was heading a team which built one of the first models of Polish economy. The results of the team's research were published in a collective work edited by him *Econometric Model of Polish Economy* (1968). Moreover, Pawłowski (1980a) also turned our attention to the necessity of taking into consideration demographic variables while constructing macroeconomic models of an economy.

Zbigniew Pawłowski's achievements concerning forecasting are considerable. He had his own established opinions on the basic theories of predicting, although some of them are generally considered controversial, like the ones relating to the problem of marking the best predictors. Besides the well-known classical rules, he promoted the one which leads to delimiting a forecast in the vicinity of the forecast's variable dominant. He suggested that this rule should be especially useful in short-term forecasting. He proposed interesting ideas of making so-called optimistic and pessimistic forecasts; these depend on favourable or unfavourable (to the development of the phenomenon described by the variable being explained) arrangements of values of explanatory variables in a model on whose basis the predictor is being constructed. Almost all the ideas in this field can be found in his following monographs: *Econometric Forecasting* (1973a), *Introduction to the Theory of Prediction* (1982), *The Theory of Econometric Forecast in Social Economy* (1968a, 1974).

In particular, Z. Pawłowski (1969) proposed a method of predicting so-called turning points of a time. He proposed a definition of so-called flexibility of a predictor and the ways to estimate it. This is important from the point of view of someone who is choosing a predictor to make a forecast of e.g. time sequences characterised by an instability of the trend course. Moreover, Z. Pawłowski (1979) also contemplated the forecasting horizon.

Z. Pawłowski (1977, 1978) discussed at length the problem of so-called alternative forecasts. He highly appreciated the role of an ex-post analysis of forecasting errors, especially in order to select a better method of forecasting different phenomena in next periods of time. This was discussed e.g. in his paper published in 1975.

He formulated an interesting question of how to mark admissible values of explanatory variables of an economic model in such a way that the value of the variable explained exceeds the level required. He called this a discriminatory prediction and described it, among others, in his paper in 1979a.

Z. Pawłowski (1974a) analysed the so-called unanimous forecast delimitation problem which, to cut a long story short, may be described simply as making such a partial forecast which is a common element of all partial forecasts made by means of using different methods. In this context, he also analysed so-called additional forecasts, i.e. the ones which are made successively as the period referred to by them comes nearer.

It seems that each of the problems sketched above is still topical for statistical and econometric studies. Professor Pawłowski was a teacher for many of us and his scientific output is certainly worth being looked into.

In the text above we have used Professor Pawłowski's biography and a detailed description of his scientific career which can be found in articles written in Polish by A.S. Barczak (1982, 1983) and S. Kwiatkowski et al. (1984). Moreover, A.S. Barczak (2007) prepared the very interesting essay about scientific achievements of Z. Pawłowski. Some personal essays about life and scientific works can be found in the papers by A.S. Barczak, J. Kordos and Z. Hellwig (1981).

#### REFERENCES

- Barczak A.S. (1982), Professor Zbigniew Pawłowski 1930–1981, *Przegląd Statystyczny* 29, z. 3/4.
- Barczak A.S. (1983), Bibliografia prac profesora Zbigniewa Pawłowskiego (Bibliography of Professor Zbigniew Pawłowski's Works), *Przegląd Statystyczny* 30, z. 3/4 pp. 139–145.
- Barczak A.S. (2007), Wpływ twórczości Prof. Zbigniewa M. Pawłowskiego na rozwój polskiej ekonometrii (The influence of Prof. Zbigniew Pawłowski's works on development of Polish econometry). *Prace Naukowe Akademii Ekonomicznej we Wrocławiu* nr 895, *Ekonometria* 7, 2007.
- Barczak A.S. (1981), J. Kordos and Z. Hellwig (1981), *Wiadomości Statystyczne* no. 10.
- Pawłowski Z. (1959), Moc pewnego testu normalności dla dużych prób. (Power of some test for normality for large sample). *Przegląd Statystyczny*, pp. 141–150.
- Pawłowski Z. (1959a), Sprawdzanie pewnej klasy hipotez złożonych testem sekwencyjnym Walda w statystycznej kontroli jakości (Testing some complex hypotheses by means of Wald's sequence test in statistical quality control). *Zeszyty Naukowe SGPiS* z. 11, pp. 231–272.
- Pawłowski Z. (1961, 1971), *Ekonometryczne metody badania popytu konsumpcyjnego (Econometric Models of Consumer Demand)*, PWN Warszawa.

- Pawłowski Z. (1963), *Applications of Survey Sampling Methods in Commerce*. UN Economic Commission for Europe, Budapest.
- Pawłowski Z. (1965, 1966, 1969), *Wprowadzenie do statystyki matematycznej (Introduction to Mathematical Statistics)*, PWN, Warszawa.
- Pawłowski Z. (1965a), Sampling methods in current statistics. In *Report of the UN European Regional Seminar*.
- Pawłowski Z. (1967), *Введение в математическую статистику (Introduction to Mathematical Statistics)*, Статистика, Москва.
- Pawłowski Z. (1968), Ekonometryczny model gospodarki polskiej. (*Econometric Model of Polish Economy*), PWN, Warszawa.
- Pawłowski Z. (1968a), *Teoria prognozy ekonometrycznej w gospodarce socjalistycznej (The Theory of Econometric Forecast in Social Economy)*, PWN Warsaw 1968 and 1974), PWN, Warszawa.
- Pawłowski Z. (1969, 1972, 1975, 1978, 1980), *Ekonometria (Econometrics)*, PWN Warszawa.
- Pawłowski Z. (1969a), Predykcja za pomocą kart kontrolnych (Prediction by means of control cards) *Przegląd Statystyczny* z. 3–4.
- Pawłowski Z. (1970), *Ekonometria (Econometrics)*, Közgazdasági és Jogi Könyvtár, Budapest.
- Pawłowski Z. (1970a), Funkcja produkcji z uwzględnieniem czynnika organizacyjnego (Production function involving organisational factor), *Ekonomista* z. 4, pp 711–719.
- Pawłowski Z. (1971, 1976), Ekonometryczna analiza procesu produkcyjnego (*Econometric Analysis of Production Process*).
- Pawłowski Z. (1972), *Wprowadzenie do statystycznej metody reprezentacyjnej. (Introduction to Survey Sampling)*, PWN Warszawa.
- Pawłowski Z. (1973), Nieparametryczny test na autokorelację (Non-parametric test for autocorrelation), *Przegląd Statystyczny*, pp. 3–10.
- Pawłowski Z. (1973a), *Prognozy ekonometryczne. (Econometric Forecasting)*, PWN Warszawa.
- Pawłowski Z. (1974), Test nieparametryczny dla weryfikacji hipotez o kilku współczynnikach autokorelacji. (A non-parametric statistical test of the hypothesis on several autocorrelation coefficients), *Przegląd Statystyczny*, pp 189–209.
- Pawłowski Z. (1974a), Analiza ciągów prognoz (An analysis of a sequence of forecasts), *Ekonomista*, z. 4, pp. 847–874.
- Pawłowski Z. (1975), On the use of ex-post information in econometric prediction. In: *Contributed Papers, 40th Session of the International Statistical Institute*, Warsaw September 1–9, pp. 656–660.
- Pawłowski Z. (1976, 1980), *Statystyka matematyczna (Mathematical Statistics)*, PWN, Warszawa.
- Pawłowski Z. (1977), Contribution to the theory of alternative predictions. *Oeconomica Polona*, z. 3–4, pp. 381–400.
- Pawłowski Z. (1978), *The Use of Alternative Predictions in Long-Term Inference (With Special Reference to Water Demand)*, IIASA, Laxenburg.
- Pawłowski Z. (1979), On the Concept of Horizon of Prediction. *Systems Science* 1979, z. 1, pp. 81–90.
- Pawłowski Z. (1979a), Discriminatory prediction and its relation to optimum control of economic systems. *Control and Cybernetics*, z. 1, pp. 55–66.
- Pawłowski Z. (1980), *Demo-econometric Model of Poland and its Application to Counterfactual Simulation*. IIASA Laxenburg.
- Pawłowski Z. (1981), *Elementy ekonometrii. (Elements of Econometrics)*, PWN Warszawa.
- Pawłowski Z. (1982), *Zasady teorii predykcji (Rules of Prediction Theory)*, PWN Warszawa.
- Sylwetki statystyków polskich (*Portraits of Polish Statisticians*) (1984) pod redakcją S. Kwiatkowskiego Wojewódzki Urząd Statystyczny w Łodzi – Polskie Towarzystwo Statystyczne, Łódź.