Preface

There is no exaggeration in saying that the development of econometrics cannot be separated from macromodelling. The first macromodels attempted to empirically verify mathematical models of the business cycle proposed by Ragnar Frisch and Michal Kalecki, but mainly in John M. Keynes's *The General Theory of Employment, Interest and Money* (an excellent historical review can be found in the work by Bodkin *et al.* (1991). It is astonishing that Keynes himself was initially very hesitant about such efforts as shown in his critique of Jan Tinbergen's study presenting a model constructed for the League of Nations. It should be added, however, that at a later time Keynes modified his attitude to the construction (and application) of macroeconometric models. The attractiveness of Keynes' theoretical proposals was huge; as a consequence, for over three following decades macromodels were Keynesian-oriented and models based on alternative paradigms started to be constructed much later.

Already during World War II the immense potential of econometric models for practical application in the simulation of alternative economic policies and forecasting was observed. A powerful impulse in this direction was given by the pioneering works by Lawrence R. Klein that brought forward a series of models for the United States (Klein, 1950). The largest of the models then, the Klein–Goldberger Model (Klein and Goldberger, 1955), contained 20 endogenous and 43 predetermined variables (19 of them being exogenous). This was, of course, a Keynesian-type model, but to a large extent it also drew on John R. Hicks' and Oskar Lange's proposals. From early 1953 it was used to prepare forecasts for the US economy. It turned out that forecasts generated using this model were definitely superior to the competing projections. These findings triggered a huge interest not only in multi-equation models but also in econometric modelling itself. In a relatively short period of time macromodels were built for most developed countries of the world, becoming a commonly used tool for macroeconomic policy analyses. Concurrently, the research in the production, investment and consumption functions gave birth to many discoveries within the theory of econometrics. Also, the multi-equation models themselves, as well as problems in estimating their parameters and analysing their properties inspired many advances (Haavelmo, 1943; Koopmans, 1949; Theil, 1958).

Unfortunately, the intensive work conducted in the 1960s and 1970s on macromodels that were constructed not only for academic purposes but also to meet the needs of governmental agencies and private companies had its negative consequences as well: specification of equations was not sufficiently based on theory, parameter estimations did not meet theoretical requirements, the simplest estimation methods were typically employed and simultaneity bias disregarded, analyses of models' properties allowing for their stochastic nature were usually neglected. This approach was reflected also in the term: 'empirical model', which intended to justify the model's weak connection with economic theory and the compromise resulting from empirical research.

The second half of the 1970s brought a surge of criticism expressed by Lucas (1976), Hendry (1980), Sims (1980) and Leamer (1983). Each of their stimulating studies addressed a different aspect of econometric modelling (or actually macromodelling).

The 'Lucas critique' caused rational expectations to be introduced into the modelling of economic agents. Paradoxically, estimation problems of models with rational expectations aroused even larger interest. Important qualifications raised by Leamer, and especially Hendry, consolidated in the 'common awareness' of modellers the need for scrupulous and adequate testing of economic hypotheses. Perhaps, the most difficult to absorb was Sims' critique.

Around the same time the work by Granger and Newbold (1974) was published, devoted to the problem of spurious regression that had been originally noted 50 years earlier by Yule (1926). Quite soon unit root tests were developed, proving that an overwhelming majority of stochastic processes generating macroeconomic time series were non-stationary. It was, however, the concept of the cointegration of variables, presented for the first time probably in the work by Granger (1984), that charted the right course toward solving the non-stationary variables' modelling problem, and the Granger Representation Theorem (e.g. Engle and Granger, 1987) provided theoretical foundations for constructing systems of equations for non-stationary series. The essential conclusion resulting from the theorem is that only reduced rank systems of difference stationary variables can be represented in the vector autoregressive (VAR), vector equilibrium correction (VEqCM) and moving average (MA) forms. Cointegration of variables is, therefore, a prerequisite for the existence of a long run equilibrium, and vice versa long run equilibrium implies cointegration. In this way, cointegration theory has underpinned the synthesis of error correction propagated by the LSE School and of VAR models advocated by Sims. This opened entirely new possibilities of interpretation, but in the first place it provided theoretical grounds for thorough testing of economic

hypotheses and for building macroeconometric models. At the same time non-trivial problems in parameter estimation appeared, especially in testing the size of the cointegrating space. A satisfactory solution to the latter question was proposed by Johansen (1988).

Undeniably, cointegration theory is one of the major achievements in the field of time series analysis and the unceasing interest in this field of research proves that many questions are still to be answered.

Traditional macromodels are built using quarterly or monthly data; macroeconomic data published at higher frequencies are few. An exception is statistical information describing financial processes, and especially transactions at the Stock Exchange. In this case, samples may include thousands of observations. Hence, it is not surprising that such samples have inspired many researchers, producing specific problems that need to be solved, but also unique opportunities for statistical analyses. It was exactly the research in financial processes that triggered rapid development of new classes of models, and especially the ARCH models, originally used by Engle (1982) to model inflation. This justifies the claim that high-frequency economic data have created another field, very important for the development of econometrics.

This volume discusses many important issues, but for obvious reasons the book is not comprehensive, forecasting is probably the most important omission. The chapters have been sequenced in alphabetical order determined by authors' names. Some chapters focus solely on methodological issues, some combine theoretical and applications, and others only deal with the application of specific macromodelling strategies.

All authors participated in the Macromodels International Conference (www.econometrics.uni.lodz.pl/macromodels) that was brought into being by Professor Wladyslaw Welfe in the year 1974 and organized in Poland on an annual basis since then. Initially, the conference was actually the only forum, where econometricians from the former East-European countries could regularly meet their colleagues working outside the socialist bloc. Although, this situation changed after the Berlin Wall collapsed, the Macromodels remained an important meeting. The following conferences, and especially the most recent one, the 30th, held in Warsaw between December 4 and 6, 2003, have proved that interest in macromodelling continues to be strong, which promises optimistic prospects.

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