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Lawrence R. Klein: Macroeconomics, econometrics and economic policy☆

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1. Introduction

"Few, if any, research workers in the empirical field of economic science, have had so many successors and such a large impact . . .". This was the conclusion of the press release in which the Royal Swedish Academy of Sciences motivated its decision to award the 1980 Nobel Prize in Economic Science to Lawrence Klein. Indeed, to this day, the way applied research is conducted, forecasts made and economic policy debated owes perhaps more to Klein than to any other economist.

An outstanding scholar and prolific writer, between 1943 and 2012 Klein authored over 350 articles and some twenty volumes, and also edited as many works. But Lawrence Klein was much more than this. In many ways his role can be likened to that of the master craftsman, whose workplace was a beehive of constant activity. His was a "workshop", or rather several workshops, in which those who had the good fortune to take part ended up acquiring the "craft", learning not only how to view the economic system using the instruments of theory, but also, and perhaps above all, how to create and utilize new quantitative tools for analysing its operation, to design forecasting scenarios and to derive practical indications for economic policy. Certainly,

☆ This article draws upon the author's introduction to the Italian collection of Lawrence Klein's main contributions to macroeconomics, econometrics and economic policy (Klein, 2007).

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nowadays no one is surprised to find daily newspapers offering analyses and assessments referring to forecasts for GDP growth, household consumption, business investment, employment, inflation, interest rates, the money supply, international trade, exchange rates and all the other economic and financial variables that are as important for economic policy as they are for the decisions of households and firms. Yet this is a relatively recent phenomenon, and one in which Lawrence Klein was a protagonist: from his pioneering work in the 1940s and 1950s, to the great season of econometric models in the 1960s and 1970s, up to the more recent development of a new industry, present worldwide and fully exploiting the potential – for the organization of large data banks, the quantitative estimates of economic relationships with time-series and cross-section data, and the solution of systems of complex and nonlinear equations – of the computer revolution and technological progress, which has increasingly marked the last forty years.

An account of this will be given in the next section, which revisits the crucial steps in Klein's professional and scientific career. The five following sections will illustrate his main contributions to theoretical and applied economics. Special attention will first be devoted to his work on the relationship between microeconomic behaviour and macroeconomic relations. His interpretation and extension, theoretical and quantitative, of the contribution of Keynes (1936) in *The General Theory* and, specifically, the concept of effective demand will then be briefly reviewed. It will next be considered how, together with a systemic approach to determining aggregate demand, Klein also strongly emphasized the need to take account – when determining investment, prices and the costs of production – of the role of supply and the constraints on productive capacity in an economy. It will then be described how this systemic approach took on concrete form in the construction and use of econometric models, large ones in particular, for interpretation, forecasting and the assessment of alternative economic policies. Lastly, Klein's position on the determinants of fluctuations and of underlying economic trends will be illustrated.

Before going any further, however, it is worth remarking that if, as the Nobel Prize motivation observed, Klein's main contributions were to the construction and analysis of empirical economic models, his work on the theoretical principles and methods of econometrics was equally outstanding. For the most part this article cites essays in which Klein addressed, at the theoretical and applied level, the main questions about the functioning of economic systems. But Klein also had a leading role in the development of econometrics. It is to him that we owe several seminal textbooks, chief among them: *A Textbook of Econometrics* (Klein, 1953), his ground-breaking and lasting guide to the study of econometrics (thoroughly revised in 1974 after twenty years), with the main results on statistical theory uniquely accompanied with concrete examples of quantifying macro and microeconomic relations; *An Introduction to Econometrics* (Klein, 1962), mostly intended for readers less interested in the formal aspects of the subject but with enlightening chapters on the statistical analysis of demand, production and costs, and on the distribution of income and wealth; *Lectures in Econometrics* (Klein, 1983c), which examines the specification and solution of econometric models, for the analysis of their dynamic properties and the production of forecasts.

As regards his specific contributions to econometric theory, after his first 1943 *Econometrica* article on the identification of an investment function (Klein, 1943), it is worth recalling the interpretation of Henry Theil's two-stage least squares method of estimation as an efficient application of the instrumental variables method (Klein, 1955); the maximum likelihood estimation of distributed lags, in particular with reference to L.M. Koyck's geometric lag distribution (Dhrymes, Klein, & Steiglitz, 1970; Klein, 1958a); the application of Le Chatelier's principle, originally introduced by Paul Samuelson with reference to demand theory, to demonstrate the efficiency of system (or complete information) estimation of econometric models compared with that of single

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