IN MEMORIAM : Jacques Drèze.

Jacques Drèze has passed away on Sunday the 25th of September 2022 in Verviers his town of birth on the 5th of August 1929.

For us, who had the chance to spend our career, or part of it, at the *Center for Operations Research and Econometrics* (CORE) created at his initiative in 1966, Jacques has been a model and a guide with a clear view, a fantastic teacher and a devoted adviser. Many, in many places, have benefitted from Jacques' immense knowledge in economics and from his permanent support, both scientific and personal. He was a beautiful mind and a beautiful heart; a beautiful mind, essentially motivated by the project of unifying economics and its related fields, using quantitative methods, looking for the macroeconomic implications of microeconomics, developing econometric tools and applications for economic policy; a beautiful heart, deeply concerned by human well-being and the disadvantaged, as exemplified by his work on the value of life, on labour management, on public good provision, on unemployment in Europe and on the Third World debt. He was also concerned by the well-functioning of institutions, such as the future of the university, or the role of the EU for economic and social security. CORE and its prestigious visitors' program, thanks initially to the support from the Ford foundation, was his initiative as well as the *European Doctoral Program in Quantitative Economics* (EDP).

The contributions of Jacques Drèze are exceptional not only by their number, and their innovative and path-breaking character, but also by their diversity. Interestingly this diversity, well spelled out in his 1971 presidential address to the *Econometric Society*, corresponds to the initial research program of CORE and to the different fields investigated by its members. But, for Jacques Drèze this diversity is mainly apparent and can be explained by two objectives which underly all his work: the extension to uncertainty of economic models (for real world relevance) and their integration into a general equilibrium theory (for a unified conceptual approach). Even papers that seem more distant from these objectives, such as his seminal work on "tâtonnement processes", or his work on Game Theory (mainly with Robert Aumann) and his work on Dynamic Programming, have been integrated in his overall project.

Uncertainty has been present in Jacques'research from the start, from his Ph.D. at Columbia University in 1958 under the supervision of William Vickrey, introducing state-dependent preferences and moral hazard. Jacques has collected twenty *Essays on Economic Decisions under Uncertainty* in 1987, a book which includes, for instance, his classic paper with Franco Modigliani on savings and portfolio choices under uncertainty. It is also present in his Bayesian approach to econometrics for identification in simultaneous equations models, an approach introduced in a working paper in 1962, and subsequently developed in his famous 1976 *Econometrica* article using ratio-form poly-t densities and the so-called *Drèze prior*. But, his most important line of research, resulting from introducing uncertainty and which has driven him to his fundamental contributions to macroeconomics and economic policy, starts from the observation that in the real world markets are incomplete, and in particular that there are uninsurable risks and an inescapable trade-off between productive and risk-sharing efficiency. This trade-off can be exploited for improvement but first-best Pareto efficiency has to be replaced by the concept of "constrained efficiency". Jacques investigated incomplete markets in two directions. One direction adopts the point of view of the shareholders of firms facing such risks, introducing what is now known as the *Drèze criterion* for shareholders collective efficiency. Still, as he discovered, a general stockholders equilibrium might be constrained inefficient (due to non-convexity of the feasibility set). The other direction adopts the point of view of workers who cannot insure the risks associated with their future terms of employment. This direction was the one that Jacques pushed the most, since he was deeply concerned by Europe persistent and increasing unemployment during the seventies. His Presidential Address to the *European Economic Association* (published in the European Economic Review in 1987), surveys the major effort he has made at the time, developing both the theory of equilibria under price rigidities and quantity rationing (*i.e. Drèze*

equilibria) and the econometrics of quantity rationing models. There was also the major project (the *European Unemployment Program*) that he directed with Layard estimating the same model in ten countries and that inspired policy recommendations in Europe. Jacques has always advocated a two-handed employment policy addressing simultaneously the demand side and the supply side. In an influential position paper produced by 13 Belgian and French economists (for a synthesis by Drèze and Malinvaud see the *European Economic Review* 1994), public investment on the demand side and reduced labour costs for low-skilled workers on the supply side is advocated. Only the supply side recommendation was followed. Another important observation made later by Jacques (and inspired by early work by John Roberts) is that price rigidities generally lead to a continuum of equilibria. We may have coordination failures and, with the same minimum wage and unemployment compensation, different rates of unemployment. The work on this topic is surveyed in his Presidential address to the *International Economic Association* in 1999 (see Chap. 3 in his book *Advances in Macroeconomics*), where his work on models integrating money is also surveyed. Fixed nominal prices limit the indeterminateness of inflation rates, but introduce real indeterminateness.

The contribution of such a great economist and great humanist, both on the scientific front and on the institutional and policy front, has been well recognized by many honours worldwide. He has received 19 honorary doctorates, 17 from European universities, one from the Hebrew University of Jerusalem and one from the University of Chicago. He is a member or associate of several Academies (the Belgian Royal Academy, the American Academy of Arts and Sciences, the Royal Netherlands Academy of Arts and Sciences, the British Academy, Academia Europaea, the National Academy of Sciences in Washington).

Jacques graduated in Economics and in Business at the University of Liège in 1951. He obtained his Ph.D. in Economics at Columbia University in 1958. As CRB Graduate Fellow 1952-1954 he visited several US universities (Columbia, Harvard, Chicago and Michigan). He was Visiting Assistant Professor at Carnegie in 1957-58 and joined the Université Catholique de Louvain in 1958. He was the Andrew D. White Professor at Large at Cornell University 1971-1977.

Jacques has also founded a large family (he has 11 great-grandchildren). Our affectionate thoughts go to his family and in particular to his sons and to Monique who shared all along his values and his efforts. Monique and Jacques formed a perfect team, on the ground and on the sea.

We miss him immensely.

Claude d'Aspremont, Pierre Dehez.