

## **Preface to the Special Issue of *Economia Politica* on the MONIAC**

by Alan Bollard

I watched the school boy as he stood in front of the machine admiring the tanks, hoses, gauges and valves. He looked like he would be more at home on a rugby field, but here he was in the Reserve Bank of New Zealand's museum in front of the world's first MONIAC machine, listening intently to a demonstration of how interest rates are determined: no longer an abstract or mathematical concept but something real, in fact a rising float in a tank driving pegs in grooves connected to other tanks. Incidentally this was the same part of the model that Lionel Robbins speculated could have solved the classic debate about the determination of interest rates between Keynes and Robertson in the 1930's.

Whether for the New Zealand rugby-playing school boy or the lofty academics of Kings College Cambridge, the MONIAC is a superb illustrative tool. Bill Phillips' genius lay in his practical conceptualisation of a complex macroeconomic system. He built it on nine differential equations and solved the system, something that could not be accurately done by anyone in 1949. Coloured water was his continuous variable, and tank capacities were calibrated to real values in the UK economy. By using transparent pipes and perspex tanks (a new material cut from the windscreens of Lancaster bombers), he had created a «white box» computer, the opposite of today's black box. It was this visual and dynamic approach that has entranced so many, from our rugby-playing school boy to international scholars, over the last 60 years.

This was a practical computer: Phillips could carry out real-world experiments, simulating aspects of fiscal and monetary policy to show the UK economy moving through an adjustment path to a new steady state, all automatically printed out on overhead graphs. A mirror image machine could be connected to illustrate trade and capital flows. There were of course limitations: prices were rudimentary; the economic model was effectively hard-wired into the computer and could not easily be changed; the machines were ungainly and leaked. As he watched the development of mainframe digital computers in the US in the 1950s, Phillips must have realised the limitations

of the MONIAC, but by then he was himself working on more complex dynamic models.

The machine that the school boy was watching in New Zealand that day is the first full MONIAC machine built by Bill Phillips in 1949, and generously donated to the NZ Institute of Economic Research by the London School of Economics in 1987. It was rebuilt by model makers and we reassembled it in New Zealand. It is now on display in full working order at the Reserve Bank of New Zealand. Its partner the «rest of world economy» sits in the London Science Museum where it fills an important gap in the development of modern computing.

Several years ago a large conference celebrated the 50<sup>th</sup> anniversary of the famous Phillips Curve article published in 1958 (see the AWH Phillips 50<sup>th</sup> Anniversary Symposium, *Economica*, (2011) 78). Now Professor Kumaraswamy Velupillai and colleagues at the University of Trento have organised a conference on the 60<sup>th</sup> anniversary of the Phillips machine and the proceedings are published in this special issue of *Economia Politica*. We still have much to learn from this strange contraption of steel, pipes, tanks and floats. All of us, academics and rugby-playing school boys alike, owe the editors a debt of gratitude for what they have achieved.