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The engineering tools that shaped the rational expectations revolution

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Abstract:

The rational expectations revolution was not only based on the introduction of Muth's idea of rational expectations to macroeconomics; the introduction of Muth's hypothesis cannot explain the more drastic change of the mathematical toolbox and concepts, research strategies, vocabulary, and questions since the 1980s. The main claim is that the shift from "Keynesian economics" to "new classical economics" is based on a shift from a control engineering approach to an information engineering methodology. The paper even shows that the "revolution" was more radical. The change of engineering tools has changed macroeconomics more deeply, not only its methodology but also its epistemology and ontology.

To show this shift in epistemology and ontology, the history of economics will be interwoven with the history of mathematics which cannot be detangled from the emergence of the digital computer and the influence of this emergence on the changed nature of mathematics: the adoption of a new concept of solution, no longer a number, a formula, or a function, but an algorithm. The result of this new concept of solution was a new approach to the analysis of processes.

Information engineering studies the fundamental limits in communication and finds its origins in Shannon's theory of communication, and incorporates the tools designed by Turing, Shannon, Kálmán, and Bellman. The resulting ontology of this kind of engineering is a world populated by machines that communicate with each other by exchanging information. This information does not, however, contain only signals about the system states but also noise that needs to be filtered out. It is not a deterministic world, but one governed by stochastic processes. The decisions these machines take is conditioned on the (noisy) information they have about the current state of the world but at the same time will affect future states. Policy in this world therefore means tracing an optimal trajectory taking all these issues into account.