The dominant paradigm of ‘mainstream economics’ relies heavily on mathematical and statistical models using empirical data, on which most economic policy making is based. However, like the unpredicted financial crisis shows, economic modelling and forecasting is notoriously difficult. The idea of economic complexity can help to unveil some of their flaws and limitations.

Our observations

- Keynes’s magnus opus ‘The General Theory of Employment, Interest and Money’ (1936) has some algebraic formulas, but one can find just one graph in the book. Economist John Hicks tried to formalize Keynes’s General Theory into microeconomic theory (like consumer demand theory) and summarized macroeconomic theory (for example, in the IS-LM model). Paul Samuelson’s work further ‘mathematized’ the economic discipline.

- Economists such as Paul Romer, Paul Krugman, and Ackerman and Nadal, argue that the models used in mainstream economics, like general equilibrium and quantitative finance models, are inherently flawed because they rely too much on mathematical analysis. These economists show that those models were unable to predict the 2008 financial crisis.

- Ludwig von Mises, an economist from the Austrian school, states that economics is a subset of praxeology: the study of human action. Praxeology rejects statistical methods, but instead it relies on deductive reasoning and theoretical axioms that guide human behavior.
The heyday of Keynesianism was the period after the Great Depression until the end of the 1950s, when it was the dominant paradigm in Western economies and the Bretton Woods system. After the 1950s, economists tried to align Keynes’s General Theory with classical economics. More specifically, following the work of Hicks and Samuelson, economists tried to absorb Keynes’s macroeconomic thoughts with microeconomic modelling. The central idea of this ‘neoclassical synthesis’ is that market forces bring the economy’s decentralized markets to an optimal equilibrium, and economic models need to show that ‘coherence’ is possible: the connections between economic aggregates (like representative households and business) are stable enough that external shocks create predictable reactions within the economic system. From these ideas, economics was modeled to the natural sciences and mathematical and statistical methods became leading in the discipline. These ideas have evolved into current ‘mainstream economics’, hence found much economic policymaking, like that of governments and central banks. However, the predictive power of these models, like for recessions, the effect of trade agreements, and financial crises, has been questionable in the past decade. The complexity of economic systems seems higher than these models assume.

Firstly, that is because these models neglect a crucial insight of Keynes’s General Theory: the distinction between ‘risk’ and ‘uncertainty’. Keynes stated that the future is inherently uncertain: not only do we not know the outcome (like when throwing a dice), but we don’t know the range and probability distribution of future outcomes either. The models of mainstream economics assume risk instead of uncertainty: they extrapolate the current state of affairs for approaching the future with a slight error margin. But uncertainty implies that we cannot use statistical modelling for forecasting the future because we have no reliable estimator of the error margin itself (i.e. the standard deviation of possible future outcomes).

Another problem is the use of economic aggregates. This assumes that all economic actors are perfectly alike, or are ‘homogeneous representative agents’. However, as first-hand experience suggests, people are not alike, and neither are businesses or governments. As human action is intentional action, depending on private (and collective) information, intentions, objectives, and because humans adapt (like in evolution) and consciously relate to external factors (i.e. culture), mathematically modelling these interactions and interdependencies underestimates their complexity. Assuming heterogeneity implies that economic problems are more like wicked problems, such as climate change. Assuming uncertainty, heterogeneity, and adaptive and reflexive economic systems rejects the idea of coherent and stable equilibria and the use statistical and mathematical methods. That because it replaces the key concept of equilibrium with that of ‘order’: sets of relatively stable patterns that emerge, but can nonetheless break down when external conditions change in an uncertain (economic) future or when the behavior of economic agents changes. For example, when the introduction of digital streaming disrupts the traditional music market, when an outsider president is elected and prefers to halt trade agreements, or when fundamental consumer preferences change over time. Furthermore, this implies that this economic order is highly dependent on the preconditions that guides and steers human behavior and in which the economic system is embedded. Examples are the political order, rule of law, society’s values and norms, social capital, trust, or cultural ideals. These ‘softer’ aspects of economics can address both the epistemological (uncertainty), anthropological (heterogeneous agents), and systemic (economic as adaptive and reflexive systems) problems of economic complexity. Next week we will look at how the concept of complexity can be integrated in economic theory and modelling.

**Implications**

- A renewed interest in economic complexity and heterodox economic schools that take this matter seriously.
- The discipline of economics will increasingly be merged and imbedded into other disciplines, like political economics, social economics, philosophy of economics, and the history of economics.