

Modelling the economy as if real data matters

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We present a framework and model that fuse time-series data for GDP, balance of payments, population, employment, energy, housing, and transport. Our model links energy demand through to final economic consumption, yet complies with national accounting standards and industrial classification. The dynamic aspects assume that supply follows demand, but is constrained in the short-term by physical infrastructure. At the same time, investment grows the physical infrastructure. We minimise the exogenous variables and tuning factors by using historical data to calibrate relationships between the time-series. Our model regenerates historical data dynamically as a basis for projecting forward scenarios to discuss pathways to a lower carbon future.

By examining the time-series ratios between different datasets, we find the key functional relationships that are robust over time. This enables us to analyse complex policies such as investment for decarbonisation, and the effects on employment and trade. The model is neither an exclusively economic, physical, nor social in nature, but upholds the integrity of each world-view through retaining their unique time-series datasets. As our model is agnostic to the way in which a nation organises its economy, it has the potential to be applied to economic development and climate change mitigation for any nation.

Simon Roberts is a physicist and Associate Director in the Foresight Group of Arup, an international design and engineering consultancy. The group employs a range of foresight techniques, such as Drivers of Change cards for workshops. Development of this modelling capability is at the quantitative end of the scale of these techniques. Prior to joining Arup, Simon was R&D manager in a manufacturer of high power laser engraving systems for the print industry.

Colin Axon is a Lecturer in the Institute of Energy Futures at Brunel University London. He researches the use of energy in the urban environment and the limits to natural resources. His main areas of interest are in transport, electricity networks, energy security, resource efficiency, and the application of robust methods for metrics and indicators. He has published more than 110 reviewed articles and technical reports.