

Smart systemic modelling: How we are able to combine IO-modells like INFORGE with LLM

Topic: Enriched IO Models

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(1) the research question

The INFORUM model INFORGE is the central anchor of the model family GINFORS “INFORGE” MORE. GINFORS stands for international trade relations and economic development (154 countries, 72 IO models), MORE analyzes and projects the 400 districts in Germany in detail. INFORGE not only establishes the link between geopolitical dynamics and regional development, but also maps central transformation processes triggered by companies, households and the state. The focus is on the common context of impact in the past, present and future. The analysis thus includes analyses of behaviors, current changes and projected development or alternative development paths described in scenarios. INFORGE thus stands for a theory-driven, empirically based and causal context of the economy. INFORGE is part of the QuBe project (www.qube-projekt.de), which is supported by the Institute for Employment Research and the Federal Institute for Vocational Education and Training in collaboration with the Society for Economic Structural Research (www.gws-os.com). QuBe works for the Ministry of Labour and the Ministry of Health, among others. The results are used in monitoring for trade associations, trade unions and other NGOs.

LLMs are primarily data-driven and also rely on empirical algorithms that are optimized for probabilities and language patterns.

What are the possibilities for combining models such as INFORGE with LLMs? What preparatory work is necessary for this?

(2) the method used

Smart Systemic Modelling (SSM) is a development perspective for INFORGE to ensure links with LLM via text-to-model interfaces. Furthermore, SSM gives the possibility to organize the data analysis of LLM and to place it in an economic-causal context.

The lecture will deal with the first steps in such a process. The economic models of the INFORUM family are particularly suitable for this purpose, as they can quickly process huge amounts of data for economic models and have exactly the ability to accompany political/social processes: They project developments and calculate alternative paths on the basis of empirically determined behaviors and scenario attitudes. This is exactly where the interface to LLMs lies.

In a first step, timelines for the period 1991 to 2025 are developed for production values in 65 industries, for example: Events (e.g. storms, political decisions) are noted for each industry by our experts. Furthermore, the approach to the models undergoes a change of perspective: the focus is on the acting groups, i.e. companies, households and the state. To this end, it is necessary to map the transformation processes taking place there in greater detail.

(3) the data used

We use additional data on consumer spending and government investment decisions according to the COFOG classification and include the income and consumption sample for Germany (2023).

(4) the novelty of the research

What is new about this approach is finding a way to conduct empirical analysis that is not only data-driven, but also incorporates qualitative information into questions of causality.