Macroeconomic forecasting using Temporal Knowledge graph and machine learning: an application to Colombia

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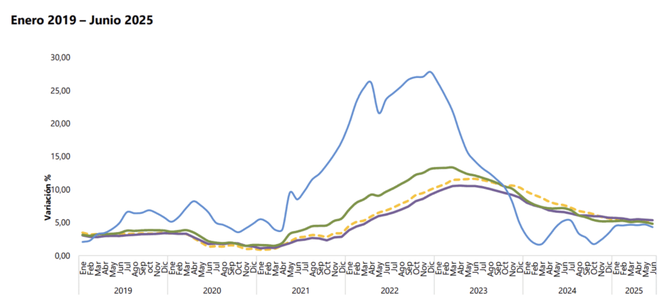
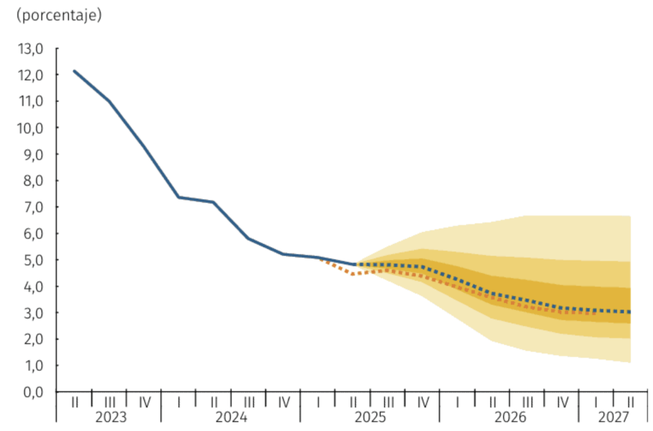
Research Purpose

- Knowledge graphs (KGs) enable a structured and connected approach to data representation, capturing diverse relationships between different elements of human knowledge.
- Real-world knowledge continually evolves and remains highly dynamic, which leads to the emergence of Temporal Knowledge Graphs (TKG) to predict future events.
- Traditional macroeconomic models such as vector autoregression (VAR) or Input-Output model are used by National Statistical Offices to predict economic trends or indicators such as Gross Domestic Product (GDP), Consumer price index (CPI) and other macroeconomic indicators.
- My research work analyses how the structure of the economy and how sectors are interconnected in a developing country for reasoning by creating a Temporal Knowledge Graph (TKG) and its ontology. This relies on extracting macroeconomic variables to enrich traditional statistical models.
- This study presents limitations and benefits of using Temporal Knowledge Graphs (TKGs) for forecasting inflation and Input-Output model in food and energy sectors in Colombia.
- This academic work contributes to the literature of Temporal Knowledge Graphs (TKGs) applied to macroeconomic domain in developing countries that can be used by private and public entities.

Macroeconomic Forecasting in Colombia: Food and Energy



Source: Data from DANE and graph from Valora Analitik

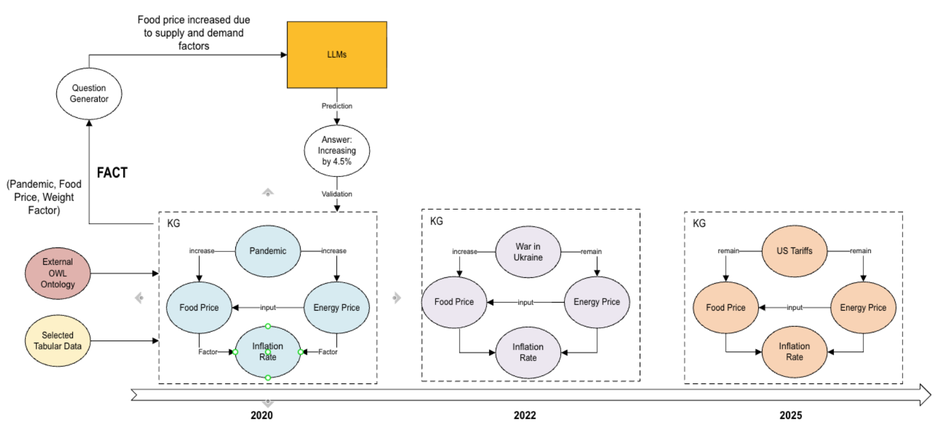


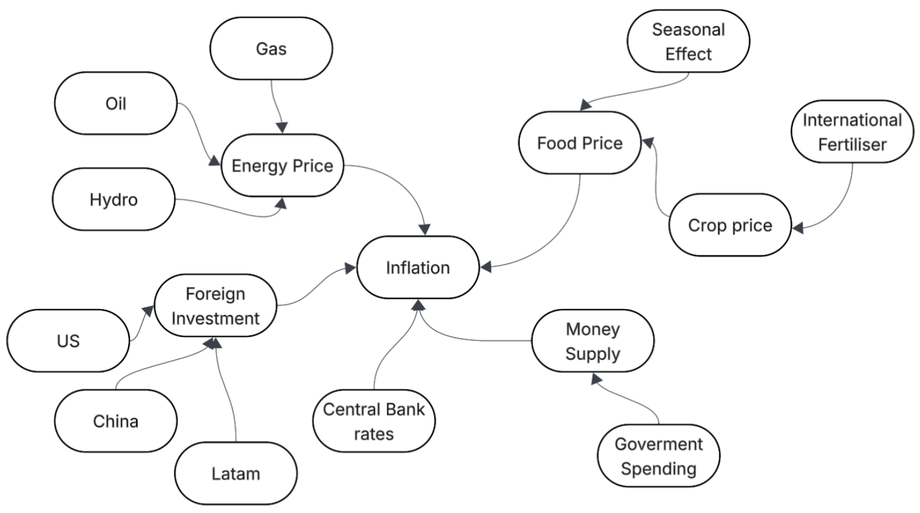
Source: Data from Central Bank and graph from Valora Analitik

Problem Statement

This research work explores how a Temporal Knowledge Graph (TKG) can enrich the prediction of macroeconomic indicators. We use Temporal Knowledge Graph reasoning method to assess its accuracy against traditional statistical models for macroeconomic forecasting. I found that there is a limited number of academic studies about Temporal Knowledge Graph (TKG) published in English in the Global South, especially in Colombia. Therefore I have identified an opportunity to be a pioneer and contribute to the Temporal Knowledge Graph literature by selecting a developing country to assess their macroeconomic indicators.

Ontology, Temporal Knowledge Graphs (TKGs) and Large Language Models (LLMs)





Source: Proposed research data model and knowledge graph of inflation

Data

The aim of this study is to explore the the construction of a macroeconomic ontology with national data sources and the development of a Temporal Knowledge Graph (TKG) with Large Large Models (LLMs) to enrich traditional statistical models to forecast macroeconomic indicators. For this purpose, we will mainly collect data from National Administrative Department of Statistics, Colombian Treasury Department and Colombian Central Bank with regards to food and energy sectors in Colombia in the last 25 years.

More Information

Researcher Profile

Research Proposal

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