

The Economic Logic of Large Language Models

How LLMs compare to structured statistical models

Generalist versus specialist—A time honored debate as to whether it's better to have a broad range of knowledge across many fields, or in-depth expertise in a single field. While this is often debated within the context of humans, it applies to models, too. For example, when it comes to understanding economic relationships, how do “generalist” large language models (LLMs) compare to “specialist” statistical models? Fundamentally, LLMs and numerical models both learn patterns in training data. However, while traditional models rely on narrowly curated datasets, LLMs can extrapolate patterns across disparate domains of knowledge. In new research, we explore whether this ability is valuable for predicting economic outcomes. To do so, we apply LLMs to structured numeric inputs as an alternative to other machine learning models.

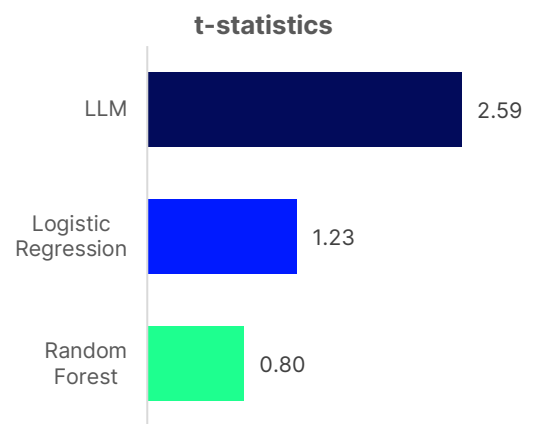
First, we ask LLMs to infer economic growth based on hypothetical conditions of five economic variables. Then, we use our Model Fingerprint framework to interpret how they use linear, nonlinear, and conditional logic to understand economic linkages. We find that their reasoning is intuitive, and it differs meaningfully from the reasoning of statistical models trained on related numeric data.

We also compare the accuracy of the LLM reasoning to the other models based on actual historical data. We find that the LLMs infer quarterly economic growth outcomes more reliably than narrowly trained statistical models, and they identify statistically significant separation in realized growth outcomes on average (Exhibit 1). We also find that LLMs’ uncertainty, as indicated by their self-reported confidence or dispersion across models, can effectively signal lower quality inferences.

These results suggest that LLMs can effectively extrapolate from disparate domains of knowledge to reason through economic relationships. This may have advantages over narrower statistical models, suggesting the potential for LLMs to add value as predictors of complex economic and financial outcomes.

For more on this topic, see our 2024 working paper: [“The Economic Logic of Large Language Models”](#) by Megan Czasonis, Huili Song, and David Turkington.

Exhibit 1: Difference in actual growth for positive and negative predications




Results based on data from Q2 1980 through Q1 2024.. For additional details, please refer to the paper cited below.
Source: State Street Global Markets

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