

Working papers economics - Inflation Drivers in Colombia: A Hemisphere Neural Network Approach

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Is economic activity solely responsible for increases in inflation and for deviations from the inflation target? Through the implementation of a hemispheric neural network, this paper shows that inflation expectations, supply-side changes, exchange rate volatility, price indexation, and wage dynamics are also important factors in explaining these developments.

Publication Date: Monday, 5 of October 2026 **Approach**

Inflation-targeting monetary policy faces a fundamental challenge: key variables affecting inflation, such as the output gap and expectations, are not directly observable. In Colombia, inflation also responds to supply shocks, exchange rate volatility, and the indexation of prices and wages, factors that can make inflation more persistent. Traditional econometric methods, often based on linear estimations, may excessively smooth information and fail to capture abrupt changes or nonlinear relationships.

This paper proposes an alternative empirical strategy to explain deviations of inflation from its target. To this end, it employs a hemispheric neural network that groups macroeconomic indicators into interpretable blocks: economic activity, short- and long-term expectations, the exchange rate, and cost pressures. This approach makes it possible to identify potential determinants of inflation deviations from target while accounting for nonlinear relationships among variables.

Contribution

The paper's main contribution is the adaptation of an advanced deep-learning architecture to a small emerging economy such as Colombia. Relative to the previous literature and the original U.S. model, the study introduces three key improvements.

First, it incorporates a real exchange rate module, driven by terms of trade and risk premia, to capture nonlinear and asymmetric exchange rate pass-through effects. Second, it broadens the cost-pressure component by including domestic factors such as regulated fuel prices, agricultural inputs, and wage-related variables. Third, it separates expectations into two latent factors: a short-term component associated with persistence and indexation, and a long-term component related to the anchoring of expectations around the inflation target.

This structure makes it possible to jointly assess the role of economic activity, expectations, the exchange rate, and cost pressures in inflation dynamics, identify nonlinear relationships, and preserve a policy-relevant

interpretation without imposing restrictive parametric assumptions.

Results

The results suggest that inflationary pressures cannot be attributed solely to economic activity. Inflation expectations and various measures of cost pressures are important factors in explaining different inflation episodes, although their relative importance varies according to the characteristics of each episode.

External cost shocks associated with transportation, commodities, and imports, as well as domestic shocks related to weather conditions affecting agricultural production and regulated prices of goods such as fuels, have played a significant role. However, their impact is amplified once they become incorporated into the price-setting process and the formation of expectations. Once these pressures emerge, backward-looking indexation of items such as rents, transportation services, and the minimum wage reinforces their persistence.

The historical decomposition illustrates this interaction. Between 2006 and 2008, demand-side factors coincided with increases in global costs. Between 2014 and 2017, inflation reflected the exchange rate depreciation that followed the decline in oil prices, together with agricultural shocks. Between 2021 and 2024, the recovery in economic activity coincided with a range of cost shocks. In particular, inflation remained elevated in 2023 due to the persistence of indexation mechanisms and inflation expectations that continued to remain at high levels.

Fuente: <https://www.banrep.gov.co/en/publications-research/working-papers-economics/inflation-drivers-colombia-hemisphere>