

Abstract

This paper develops a multivariate regression-based indicator constructed from non-traditional economic variables to improve real-time estimation of aggregate economic output and to identify potential economic downturns and recessions in future years by mimicking GDP at a higher frequency than the official value is released (i.e., quarterly). This indicator reduces economic reporting delays by blending real-activity data with forward-looking financial indicators through a structured lag framework, thereby capturing both general and specific economic dynamics in the global economy. The results of this analysis provide an accurate indicator (89.40% similarity to the industrial production index) and diagnostic insights from residual analysis. The results indicate that combining leading and contemporaneous indicators improves the robustness of macroeconomic nowcasting frameworks. The proposed indicator demonstrates the value of integrating multiple non-traditional economic channels into a unified framework for real-time macroeconomic monitoring. This paper argues that GDP is able to be accurately tracked using non-traditional, high frequency indicators, overcoming reporting delays associated with GDP quarterly release by using a multivariate regression model combining real-activity, financial stress, and labor market indicators and data.

A Regression-Based Indicator for Economic Forecasting: Using Alternative Data to Track GDP in Real Time

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Introduction

Gross Domestic Product (GDP) is widely used by economists to measure the overall health of the economy. However, GDP is only released every financial quarter, with a delay of ~30 days after the quarter ends as economic data is compiled[1]. This makes it difficult to assess economic conditions in real time, especially during periods of rapid economic change.

Can non-traditional, high-frequency economic indicators accurately track U.S. economic activity before official GDP data are released?

Previous research established nowcasting as a way to estimate key macroeconomic variables at a higher frequency using information released more frequently than GDP. Giannone, Reichlin, and Small (2008), developed a framework that updates GDP estimates as new economic data become available, taking out noise and filtering amounts of high-frequency data through a mathematical model[2]. However, many existing approaches rely heavily on traditional indicators. This study examines whether data derived from alternative indicators can also provide useful real-time economic signals and an insight into predicting GDP at a higher frequency.

Methods

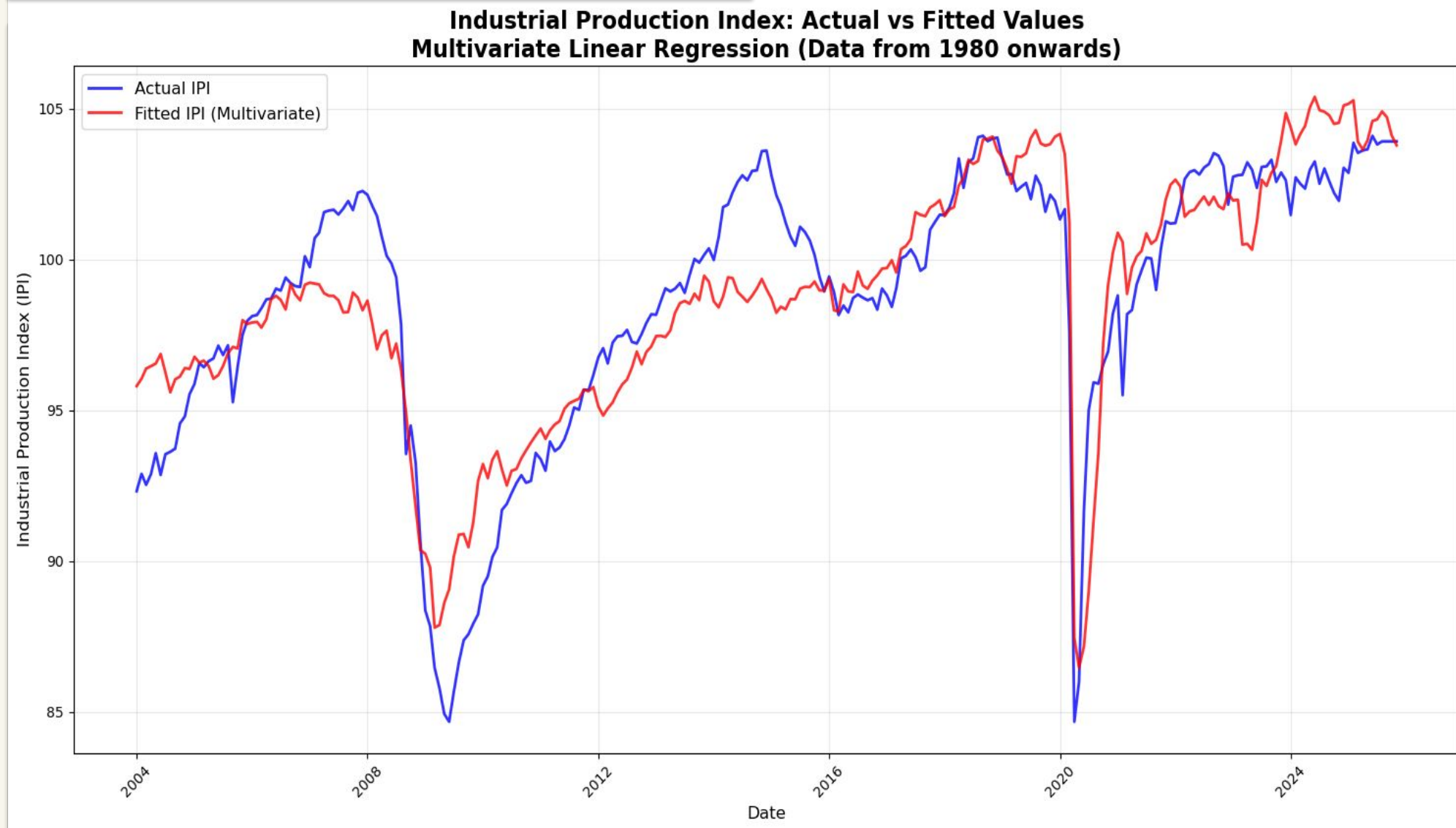
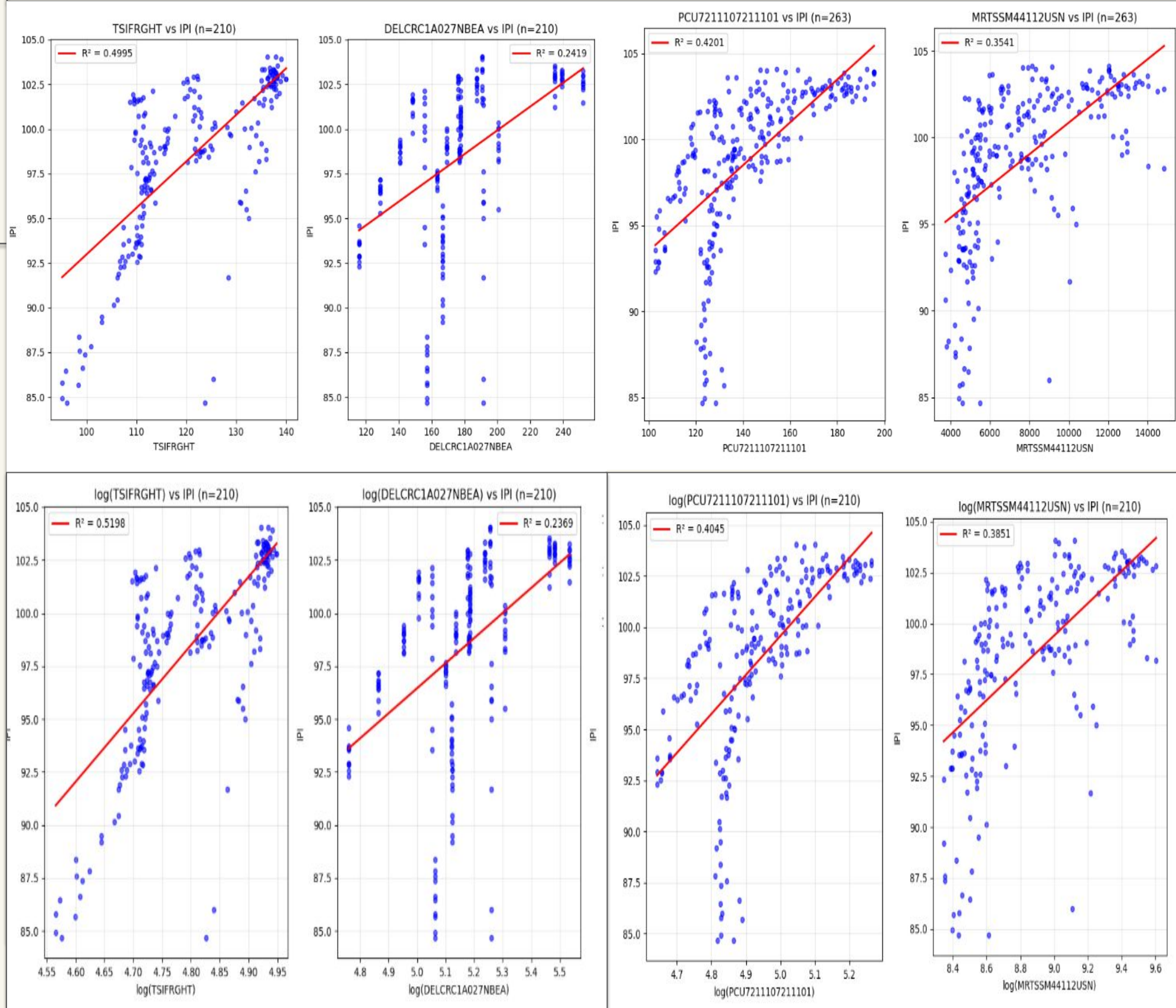
The economic indicators were selected based on their ability to capture different dimensions of economic activity and their economic relationship with industrial production(Proxy to GDP). Real-activity indicators capture current production and consumer activity, financial indicators provide signals of current or future economic conditions, and labor-market indicators help identify when economic changes spread to employment. The variables chosen were freight truck volumes, electricity usage, hotel/motel rentals, automobile rentals(real-activity), along with T10Y3M and NFCI(financial), and Initial unemployment claims(labor-market).

- 1. **Data Collection:** Economic data were collected from the Federal Reserve Bank of St. Louis (FRED)[3]. Information such as the mean, median, minium, maximum, standard deviation, first recording date, and frequency were noted for each variable individually.
- 2. **Preliminary Analysis:** The indicators were tested individually using univariate regression(against IPI. The coefficient of determination (R²) was used to evaluate the variation in IPI.
- 3. **Data Transformation:** Log transformations were applied to selected variables to reduce skewness.
- 4. **Composite Model:** The indicators were combined into a multivariate regression model. The Financial variables were incorporated to capture changing financial conditions
- 5. **Model Evaluation:** Predicted IPI values were compared with actual IPI values, while residual plots and distributions were examined to evaluate prediction errors and model fit. Initial unemployment claims were subsequently incorporated to capture labor-market stress and produce the final model.

Results

The final multivariate regression model achieved an 89.40% similarity between fitted and actual Industrial Production Index (IPI) values. Adding initial unemployment claims increased model performance from 80.14% to 89.40%, a 9.26 percentage-point improvement. The fitted model generally followed movements in actual IPI, including the major declines during the 2008 financial crisis and 2020 pandemic, although it slightly underestimated the magnitude of these downturns. Overall, the results suggest that combining real-activity, financial, and labor-market indicators provides a stronger estimate of economic activity because each group captures a different dimension of economic conditions.

Additionally, when applied to March 2026 data, the model estimated an IPI of 104.15, corresponding to approximately 0.6% annual growth and indicating slight economic expansion.



Discussion

These findings support the study’s hypothesis that non-traditional, high-frequency indicators can provide useful signals of current U.S. economic activity before official GDP data are released. The findings are consistent with Giannone, Reichlin, and Small (2008), which demonstrated that real-time estimates of GDP can be estimated through higher-frequency information can improve[2]. However, this study extends previous research by showing that alternative data in the fields of real-activity, financial, and labor-market indicators can also effectively track changes in economic activity when combined. Additionally, the model’s tendency to underestimate the magnitude of major downturns suggests that sudden economic shocks remain difficult to fully capture using historical relationships, as these shocks can deviate from normal economic patterns.

Conclusion

This study shows that U.S. economic activity can be nowcasted using a combination of non-traditional real-activity, financial, and labor-market indicators. The model demonstrates that a simple and interpretable approach can still provide useful real-time estimates of economic activity using a limited set of meaningful indicators. Future research could improve the model by using higher-frequency or proprietary data(private data), applying more advanced model specifications, and testing the framework in the context of other countries.

References

- [1] BEA, “Gross Domestic Product | U.S. Bureau of Economic Analysis (BEA),” Bea.gov. Accessed: Oct. 05, 2026. [Online]. Available: <https://www.bea.gov/data/gdp/gross-domestic-product>
- [2] G. Domenico, L. Reichlin, and D. Small, “Nowcasting: The Real-Time Informational Content of Macroeconomic Data,” *Journal of Monetary Economics*, vol. 55, no. 4, pp. 665–676, May 2008, doi: 10.1016/j.jmoneco.2008.05.010.
- [3] FRED, “FRED Economic Data,” Stlouisfed.org. Accessed: Oct. 05, 2026. [Online]. Available: <https://fred.stlouisfed.org/>

