ISM Manufacturing PMI and Core CPI

A 6- to 9-Month Forecast from Two VAR Models

Executive Summary

This report uses two VAR-based models to forecast the ISM Manufacturing PMI and Core CPI over the next 6 to 9 months, using monthly data from December 1997 to July 2026. The final models use six variables, selected from 15 candidates through Granger causality tests and out-of-sample testing.

- **Growth:** The PMI is likely to cool gradually but stay in expansion. The model forecasts 53.7 in January 2027 and 53.1 in April 2027, down from 55.6 in July 2026. The probability of the PMI falling below 50 is about 8% at six months and about 16% at nine months.
- **Inflation:** Core CPI is likely to hold steady near 2.4% through April 2027, with a 90% range of 1.4% to 3.5% at nine months. The model's August forecast of 2.43% was close to the actual reading of 2.45%.
- **A rare divergence:** Core PCE, the inflation measure the Fed relies on, was 3.3% in July, about 0.9 percentage points above Core CPI. From 2015 to 2019, Core PCE ran on average about 0.45 points below Core CPI. The gap is concentrated in transportation services, which have been pushed up by higher jet fuel costs, and in financial services, which carry much more weight in PCE.
- **Model accuracy:** In out-of-sample tests since 2010, excluding the COVID period, the PMI model's 6-month and 9-month forecast errors were about 17% and 24% lower than a random-walk benchmark. The Core CPI model's errors were about 8% and 15% lower.
- **Key risks:** A longer energy shock from the Middle East conflict, further Fed tightening, and a slowdown in AI-related capital spending are not fully captured by the models. These are the main risks to the forecasts.

DATA THROUGH

July 2026

Monthly data from December 1997 to July 2026, a total of 344 observations

KEY FIGURES

ISM PMI, July 2026	**55.6**
PMI forecast, Jan 2027	**53.7**
PMI forecast, Apr 2027	**53.1**
P(PMI < 50), 6 / 9 months	**8% / 16%**
Core CPI forecast, Apr 2027	**2.44%**
Core CPI 90% range, 9 months	**1.41% to 3.48%**
Core PCE, July 2026	**3.3%**

MODEL ACCURACY

Lower out-of-sample forecast error than a random-walk benchmark, 6 / 9 months, since 2010, excluding the COVID period

PMI model	**about 17% / 24%**
Core CPI model	**about 8% / 15%**

MODELS

Candidates tested	**15**
Final variables	**6**

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This article is built on two separate vector autoregression (VAR) models that forecast Core CPI (an inflation metric) and the ISM Manufacturing PMI (a growth metric) over the next 6 to 9 months. The sections below explain why we focus on these two metrics and why we use a VAR framework.

What We Forecast

Core CPI, which excludes volatile food and energy prices, is widely regarded as one of the key measures of underlying inflation in the overall economy. Compared with headline CPI, Core CPI helps us observe how the energy shocks from the Middle East conflict are transmitted into broader inflation, and gives us a clearer picture of how inflation is affecting prices for consumers.

The ISM Manufacturing PMI, on the other hand, is one of the most widely used metrics of economic activity and growth. It is a leading indicator that captures overall manufacturing expansion, including demand for new orders of goods, inventories, and other components. The ISM Manufacturing PMI is also a leading indicator of GDP, which reflects the total value created in the economy.

Why a VAR Model?

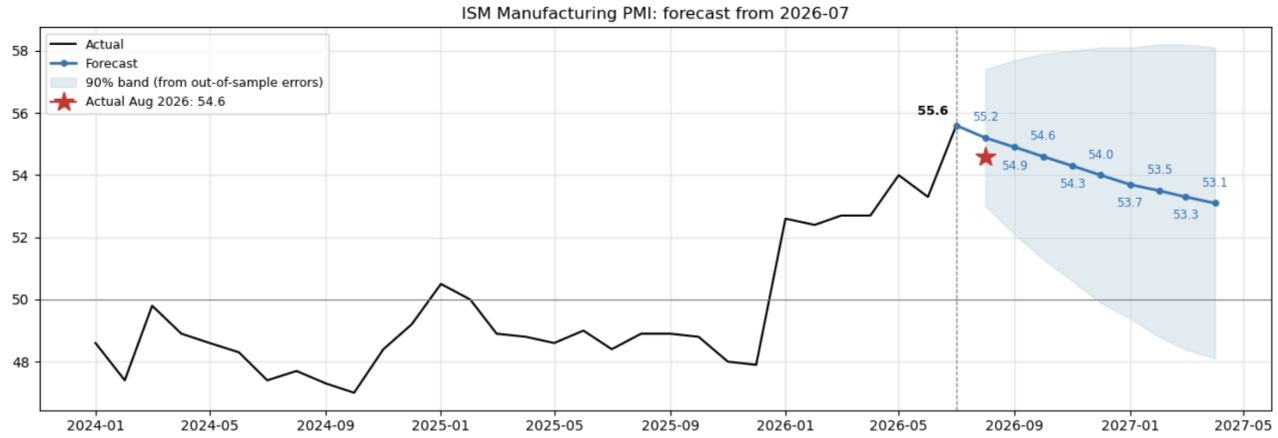
The vector autoregression (VAR) model is one of the most widely used tools in macroeconomic forecasting. Its key feature is that it treats every variable as endogenous. Each variable is explained by its own past values and by the past values of every other variable in the system. This matches how the macroeconomy works: key variables move together and influence each other over time.

Macroeconomic factors are closely linked. Changes in employment affect consumption, and changes in consumption then feed into production and growth. A VAR captures these feedback effects because all variables in the system help predict one another at the same time.

Univariate models such as ARIMA work differently. They forecast a single series using only its own history, which works best when the series has no clear outside drivers. The ISM Manufacturing PMI and inflation are shaped by credit conditions, business investment, and money growth, so a univariate model leaves out information that matters. We still use a simple univariate model, an AR(2), as a benchmark to test whether the VAR adds real value. For the PMI, averaging the two produced more accurate forecasts than either model alone, because each model makes different kinds of errors.

Results from the Two Models

Exhibit 1. ISM Manufacturing PMI Forecast (Growth Model)



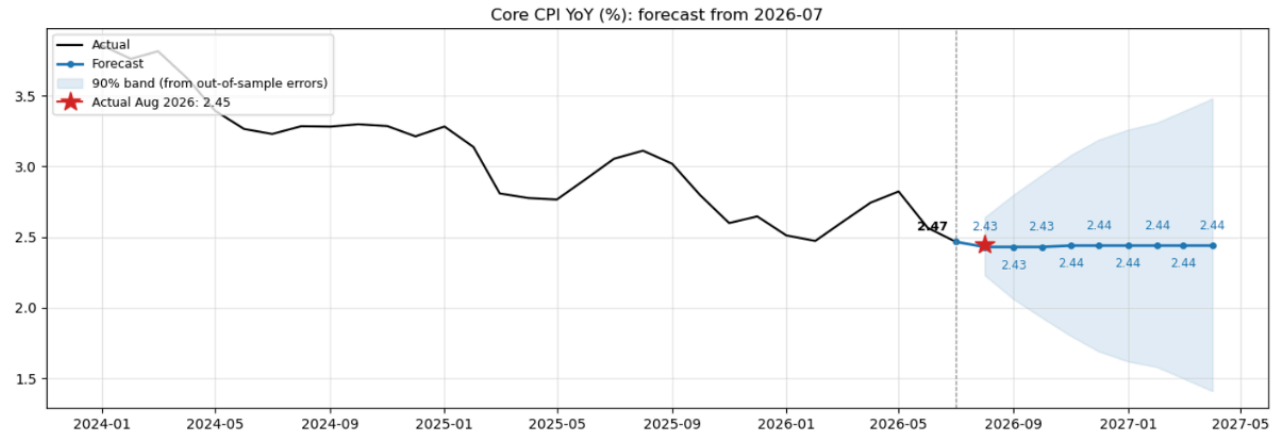
Source: FactSet, FRED, author's calculations.

The growth model forecasts a slight downward trend in the ISM Manufacturing PMI over the next 6 to 9 months. This suggests that the ISM Manufacturing PMI might have already peaked in July 2026 and will enter a steady cooling trend while remaining above 50. The August reading of 54.6, down from 55.6 in July, is consistent with this view.

However, part of the projected decline reflects the model's tendency to revert toward its long-run average, and S&P Global's September flash PMI showed the fastest private-sector expansion in more than five years.

The model puts the probability of the PMI falling below 50 at about 8% in six months and about 16% in nine months. This points to continued growth in the overall economy, but at a cooler pace.

Exhibit 2. Core CPI Forecast (Inflation Model)



Source: FRED, author's calculations.

The inflation model forecasts a steady trend in inflation, indicating that Core CPI will likely remain stable over the next 6 to 9 months. This stable Core CPI forecast suggests that inflation is likely to remain contained over this period. However, as discussed later in this paper, Core PCE, the inflation measure the Fed relies on, may show a different picture of underlying inflation, and we will explain this divergence.

Exhibit 3. Summary of 6- to 9-Month Growth and Inflation Forecasts, from July 2026

Month	Horizon	ISM PMI	PMI 90% range	Probability PMI < 50	Core CPI YoY	Core CPI 90% range
Aug 2026	1 mo	55.2	53.0 to 57.4	0%	2.43%	2.23% to 2.64%
Sep 2026	2 mo	54.9	52.1 to 57.7	0%	2.43%	2.06% to 2.80%
Oct 2026	3 mo	54.6	51.3 to 57.9	1%	2.43%	1.93% to 2.94%
Nov 2026	4 mo	54.3	50.6 to 58.0	3%	2.44%	1.80% to 3.08%
Dec 2026	5 mo	54.0	49.9 to 58.1	5%	2.44%	1.69% to 3.19%
Jan 2027	**6 mo**	**53.7**	**49.4 to 58.1**	**8%**	**2.44%**	**1.62% to 3.26%**
Feb 2027	7 mo	53.5	48.8 to 58.2	11%	2.44%	1.58% to 3.31%
Mar 2027	8 mo	53.3	48.4 to 58.2	13%	2.44%	1.50% to 3.39%
Apr 2027	**9 mo**	**53.1**	**48.1 to 58.1**	**16%**	**2.44%**	**1.41% to 3.48%**

PMI forecast is the average of a VAR(2) and an AR(2). Core CPI forecast is from a VAR(2) with M2 and velocity. 90% ranges are based on each model's out-of-sample errors since 2010, excluding March 2020 to December 2021. Highlighted rows mark the 6- and 9-month horizons. August 2026 actuals: PMI 54.6, Core CPI 2.45%.

Source: FactSet, FRED, author's calculations.

Model Variables and Qualitative Framework

The growth model, which forecasts the ISM Manufacturing PMI, uses monthly data from December 1997 to July 2026, a total of 344 observations. The qualitative framework we apply in the growth model centers on the ISM Manufacturing PMI together with indicators of business investment and borrowing conditions.

The variables were selected using Granger causality tests and out-of-sample forecast comparisons. The full selection process is described in the Methodology section.

Exhibit 4. Growth Model Variables Used to Forecast the ISM Manufacturing PMI

Variable	Role	Form	Source	Economic channel
ISM Manufacturing PMI	Target	Level	FactSet	Manufacturing activity
New Orders (core capital goods orders)	Explanatory	YoY %	FRED (NEWORDER)	Business investment cycle, including AI-related capex
Baa corporate bond yield minus 10-year Treasury yield	Explanatory	Level (pp)	FRED (BAA10YM)	Financing conditions for the private sector
Core CPI	Explanatory	YoY %	FRED (CPILFESL)	Cost pressure, squeeze on real incomes, policy tightening

Total: 4 variables (1 target, 3 explanatory), each entered with 2 monthly lags in a VAR(2). The final PMI forecast averages this VAR with an AR(2) of the PMI.

Source: FactSet, FRED.

The model is a VAR with two lags, which means that each variable is explained by the values of all four variables over the previous two months. The final PMI forecast averages this VAR with an AR(2) model, which uses only the PMI's own values over the previous two months.

The inflation model, which forecasts Core CPI, also uses monthly data from December 1997 to July 2026, a total of 344 observations. The qualitative framework we apply in the inflation model is the quantity theory of money, which states that MV = PY, where M is the money supply, V is the velocity of money, P is the price level, and Y is real output.

The variables were selected using Granger causality tests and out-of-sample forecast comparisons. The full selection process is described in the Methodology section.

Exhibit 5. Inflation Model Variables Used to Forecast Core CPI

Variable	Role	Form	Source	Economic channel
Core CPI	Target	YoY %	FRED (CPILFESL)	Underlying consumer inflation
M2 money supply	Explanatory	YoY %	FRED (M2SL)	Quantity of money (M in MV = PY)
Velocity of money (nominal PCE / M2)	Explanatory	YoY %	Constructed from FRED (PCE, M2SL)	How fast money is spent (V in MV = PY); with M2, it gives nominal consumer spending

Total: 3 variables (1 target, 2 explanatory), each entered with 2 monthly lags in a VAR(2).

Source: FRED.

The model is a VAR with two lags, which means that each variable is explained by the values of all three variables over the previous two months. Because velocity is nominal PCE divided by M2, M2 growth and velocity growth together roughly equal nominal consumer spending growth. The model is therefore best read as linking Core CPI to money growth and nominal demand, not as a strict test of the quantity theory.

Besides the variables above, we also included dummy variables to reduce the effect of historical outliers (shocks and events) that might introduce bias and inaccuracy into our models. The dummy variables cover October 2008 (the global financial crisis), March to June 2020 (the COVID-19 pandemic shock), and March to May 2021 (base effects relative to the spring 2020 trough, together with the economic reopening and the March 2021 fiscal stimulus).

Implications of Our Model Results and What Might Be Missing from the Models

Implications

The growth model, as mentioned above, forecasts a cooler but continuing expansion in economic activity and the manufacturing sector. The forecast ISM Manufacturing PMI stays above 50 and settles in a range of 53 to 54 over the 6- to 9-month horizon, showing continued strength in the expansion.

The inflation model, on the other hand, shows inflation holding at a stable level, with no further easing over the next 6 to 9 months. Core CPI is forecast to stay around 2.44% at a very steady pace, with no strong signal of worsening.

In conclusion, the models point to an economic cycle of continued growth and stable inflation, which could be classified as a mildly inflationary phase, where inflation persists and growth continues.

What Might Be Missing from the Models

However, we need to acknowledge that our models may miss several factors that could play very important roles in the economy going forward.

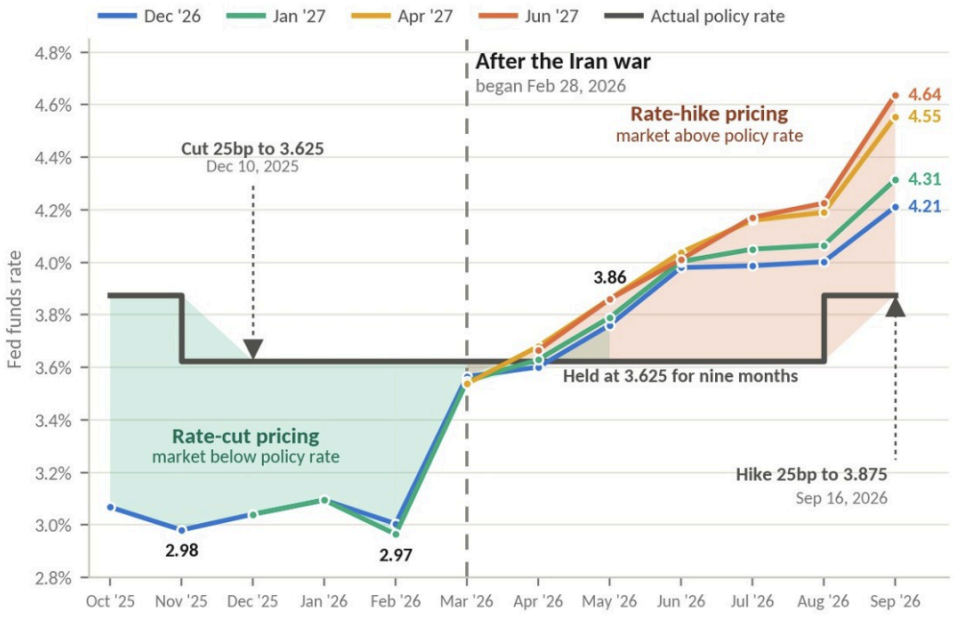
First, neither model includes the recent rate hike cycle. We did not include the federal funds rate because it changes infrequently and affects the economy with long lags, and it showed no significant predictive power for Core CPI in our Granger causality tests. However, the recent rate hike, together with market expectations of further hikes that can be observed in the CME FedWatch Tool (Exhibit 6), may play an important role in both growth and inflation.

Among the variables in the growth model, New Orders may be affected by rate hikes, as businesses may reduce investment and manufacturing activity in response to higher financing costs. AI-related capex, a key driver of recent orders, is also becoming more rate-sensitive as its funding shifts from tech companies' own cash flow to bonds and data center asset-backed securities. In early 2026, Oracle sold $25 billion of bonds and Alphabet more than $20 billion, including a rare 100-year bond. The effect may be uneven over time, however. Some firms may even accelerate orders in the near term to lock in financing before rates rise further, which could keep New Orders strong at first and cause a sharper slowdown later. The rate hike cycle may also change the spread between Baa corporate bond yields and 10-year Treasury yields, which would change the overall forecast.

The rate hike cycle will also affect the inflation model through its two explanatory variables. Rate hikes typically slow M2 growth, which helps lower inflation. At the same time, higher rates raise the opportunity cost of holding money, which tends to increase velocity, so the two effects partly offset each other in the short run. However, the inflation story could also look different when we compare the Core PCE and Core CPI trends.

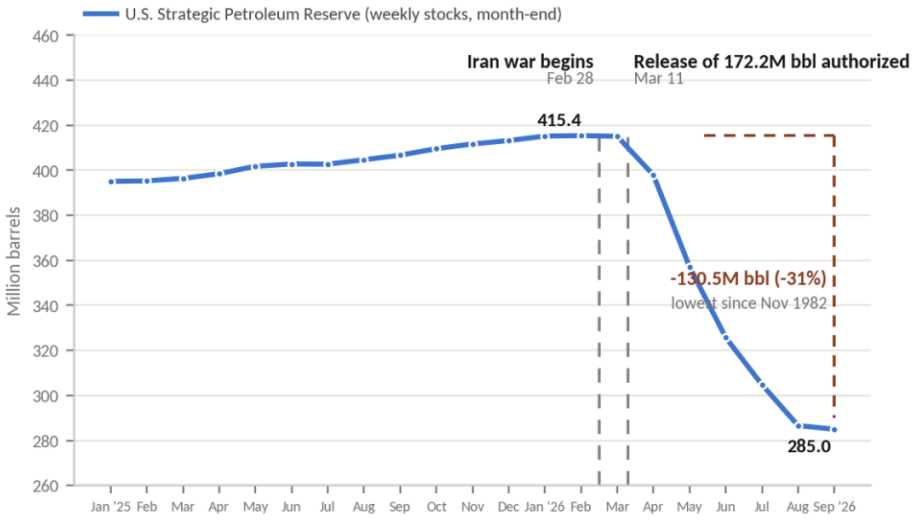
Another factor that we believe could play a major role is the long-lasting energy shock and geopolitical tension in the Middle East (Exhibit 7). We did not include it in our model for three reasons. First, Core CPI itself excludes volatile energy prices. Second, energy shocks and geopolitical tensions can hardly be forecast with economic data alone. Third, adding oil prices to the inflation model did not meaningfully improve forecast accuracy in our out-of-sample tests.

Exhibit 6. Market-Implied Fed Funds Rate Paths versus the Actual Policy Rate



Source: CME FedWatch, September 20, 2026.

Exhibit 7. U.S. Strategic Petroleum Reserve Stocks



Of the 285 million barrels remaining, more than a quarter cannot be drawn because of aging infrastructure, per a May 2026 GAO report, leaving about 180 million barrels usable.

Source: EIA.

However, as these shocks and tensions continue to prove long-lasting, we suggest that readers consider adding an energy or geopolitical risk premium when viewing the inflation forecast. We also see that Core PCE, which also excludes energy, has started to trend upward and now runs above Core CPI, because its different composition captures price pressures that Core CPI does not fully reflect.

Methodology

A. Data Extraction and Sourcing

All data are monthly. Most series come from the Federal Reserve Bank of St. Louis FRED database, accessed through its API. The ISM Manufacturing PMI and its sub-indices come from FactSet, because FRED no longer publishes ISM data.

We started with a broad pool of candidates chosen on economic grounds. Several were removed at the data stage, before any model was estimated:

- The 5-year TIPS breakeven inflation rate is only available from 2003, which would have shortened the sample by about five years. We tested the University of Michigan one-year inflation expectations instead.
- Average hourly earnings growth failed both stationarity tests, so we dropped it.
- For the policy rate, we considered the 2-year Treasury yield but chose the federal funds rate.
- Revolving credit, total consumer credit, and the broad trade-weighted dollar index were reviewed but not carried into the models.

The remaining 15 candidates were tested inside VAR models. Table A1 lists each candidate and the outcome.

Table A1. Candidate Variables and Selection Outcomes

Candidate	Model	Outcome	Reason
New Orders (core capital goods orders, YoY)	**Growth**	**Kept**	**Specifications with New Orders forecast better at 6 and 9 months, although not significant in Granger tests**
Baa minus 10-year Treasury spread	**Growth**	**Kept**	**Granger p = 0.001**
Core CPI (YoY)	**Growth**	**Kept**	**Granger p = 0.001**
Initial jobless claims (log level)	**Growth**	Dropped	Worsened out-of-sample forecasts
Building permits (YoY)	**Growth**	Dropped	No predictive power (Granger p = 0.957)
ISM Backlog of Orders	**Growth**	Dropped	The specification using New Orders forecast better
ISM Customers' Inventories	**Growth**	Dropped	The specification using New Orders forecast better
ISM New Orders	**Growth**	Dropped	Forecast worse than core capital goods orders in the same specification; overlaps heavily with the PMI
M2 (YoY)	**Inflation**	**Kept**	**Granger p = 0.002**
Velocity, nominal PCE / M2 (YoY)	**Inflation**	**Kept**	**Granger p = 0.001**
WTI crude oil (YoY)	**Inflation**	Dropped	Almost no change in out-of-sample forecasts
PPI, intermediate materials (YoY)	**Inflation**	Dropped	Worsened out-of-sample forecasts
University of Michigan 1-year inflation expectations	**Inflation**	Dropped	Granger p = 0.499
Federal funds rate (12-month change)	**Inflation**	Dropped	Granger p = 0.735
ISM Manufacturing PMI	**Inflation**	Dropped	Granger p = 0.517

15 candidates tested; 5 kept (3 in the growth model, 2 in the inflation model). Granger p-values are from Table A3: round 2 for kept variables, round 1 for candidates dropped at the Granger stage.

B. Data Cleaning

- **Frequency.** Weekly initial jobless claims were converted to monthly averages. Only months with at least four weekly observations were kept.
- **Missing Core CPI for October 2025.** The Bureau of Labor Statistics did not publish October 2025 CPI data because of the federal government shutdown. We filled the gap by log-linear interpolation between September and November 2025 and flagged the month in the dataset.
- **Velocity of money.** The official M2 velocity series is quarterly, because it divides GDP by M2. We built a monthly measure by dividing nominal personal consumption expenditures (PCE) by M2. PCE is the largest component of GDP and matches the consumer basket that Core CPI measures.
- **ISM data.** The FactSet history runs through January 2026. We added February to August 2026 values from FactSet and rounded all values to one decimal place, matching ISM's published precision. August 2026 values are used only to check the first forecast month. The models themselves use data through July 2026.
- **Sample alignment.** New Orders data begin in February 1992, and ISM Customers' Inventories begin in December 1996. To keep all specifications comparable, all series start in December 1996. After 12-month transformations, the estimation sample runs from December 1997 to July 2026, a total of 344 months. July 2026 is the last month for which every series was available, because nominal PCE and New Orders are released with a lag.
- **Continuity.** We checked that every final dataset has no gaps between its first and last month.

C. Stationarity Checks

A VAR requires stationary variables. We used two tests with opposite null hypotheses. The Augmented Dickey-Fuller (ADF) test assumes a unit root, and the KPSS test assumes stationarity. We treated a series as stationary when the ADF test rejected at the 5% level and the KPSS test did not.

We transformed each variable according to its type. Diffusion indices (ISM) and interest rate spreads enter in levels. Trending series, such as prices, money, and orders, enter as 12-month percent changes. Initial claims enter as a log level, and the federal funds rate as a 12-month change.

All final variables passed both tests except Core CPI YoY (ADF $p = 0.134$, with KPSS also rejecting stationarity), as shown in Table A2. We then applied the Zivot-Andrews test, which allows for one structural break. It rejected the unit root ($p = 0.003$) and placed the break in January 2021. This indicates that Core CPI YoY is stationary with a one-time shift in its mean, rather than a true unit root. We therefore kept the YoY form. The break test is used only to confirm that Core CPI YoY is stationary. Adding a level dummy for the break made out-of-sample forecasts worse (Table A4), so the final inflation model does not include it. We put forecast accuracy ahead of fitting the break.

Table A2. Stationarity Tests for the Final Model Variables

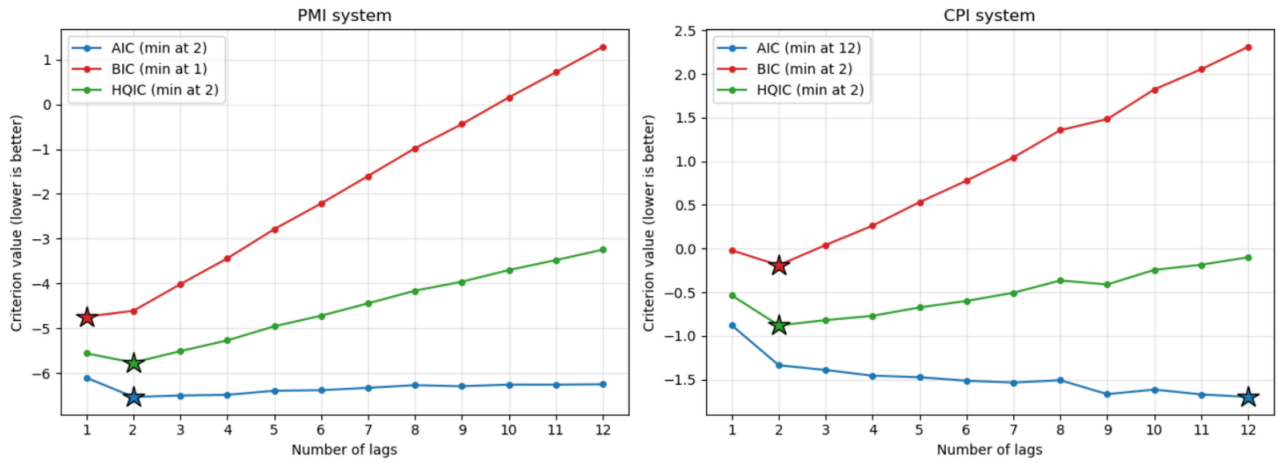
Variable	Model	Form	ADF stat	ADF p	KPSS stat	KPSS p	Result
ISM Manufacturing PMI	Growth	Level	-3.82	0.003	0.11	> 0.10	Stationary
New Orders (core capital goods orders)	Growth	YoY %	-4.27	0.001	0.06	> 0.10	Stationary
Baa minus 10-year Treasury spread	Growth	Level	-3.65	0.005	0.43	0.064	Stationary
Core CPI	Both	YoY %	-2.43	0.134	0.75	< 0.01	Stationary with one structural break (Zivot-Andrews p = 0.003, break in January 2021)
M2 money supply	Inflation	YoY %	-3.77	0.003	0.08	> 0.10	Stationary
Velocity of money (nominal PCE / M2)	Inflation	YoY %	-3.13	0.025	0.17	> 0.10	Stationary

ADF null hypothesis: unit root. KPSS null hypothesis: stationary. A series is treated as stationary when the ADF test rejects at the 5% level and the KPSS test does not. KPSS p-values are bounded by lookup tables, so values are shown as > 0.10 or < 0.01 at the bounds. Sample: December 1997 to July 2026, 344 monthly observations.

D. Model Selection

Lag length. We compared the AIC, BIC, HQIC, and FPE criteria for up to 12 lags (Figure A1). For the growth system, three of the four criteria chose 2 lags, and the BIC chose 1. For the inflation system, the BIC and HQIC chose 2 lags, while the AIC and FPE chose 12, the upper bound. Twelve lags would require 97 parameters per equation in the eight-variable screening system, which would overfit a sample of this size. We used 2 lags for both models.

Figure A1. Lag-Length Criteria (AIC, BIC, HQIC) for the PMI and CPI Systems



Event dummies. The COVID-19 dummies (March to June 2020) were set in advance. The October 2008 and March to May 2021 dummies were added after residual diagnostics showed standardized residuals above four standard deviations in those months. October 2008 reflects the global financial crisis. March to May 2021 reflects base effects relative to the spring 2020 trough, together with the economic reopening and the March 2021 fiscal stimulus.

Granger screening. For each candidate, we tested whether its two lags jointly help predict the target variable, given the target's own history and the other variables in the system. This screen removed candidates with no predictive content (Table A3).

Table A3. Granger Causality Screening

Candidate	Model	Round 1 p-value	Round 2 F-stat	Round 2 p-value	Outcome
Baa minus 10-year Treasury spread	**Growth**	**< 0.001**	**7.01**	**0.001**	**Kept**
Core CPI (YoY)	**Growth**	**0.001**	**6.62**	**0.001**	**Kept**
ISM Customers' Inventories	**Growth**	0.012	3.72	0.024	Dropped after out-of-sample tests
ISM Backlog of Orders	**Growth**	0.014	3.27	0.038	Dropped after out-of-sample tests
Initial jobless claims (log level)	**Growth**	0.121	2.01	0.135	Dropped after out-of-sample tests
New Orders (core capital goods orders, YoY)	**Growth**	**0.538**	**0.59**	**0.552**	**Kept based on out-of-sample tests**
Building permits (YoY)	**Growth**	0.957	n/a	n/a	Dropped at the Granger stage
Velocity, nominal PCE / M2 (YoY)	**Inflation**	**< 0.001**	**7.14**	**0.001**	**Kept**
M2 (YoY)	**Inflation**	**< 0.001**	**6.08**	**0.002**	**Kept**
PPI, intermediate materials (YoY)	**Inflation**	0.266	2.05	0.129	Dropped after out-of-sample tests
WTI crude oil (YoY)	**Inflation**	0.222	1.39	0.249	Dropped after out-of-sample tests
University of Michigan 1-year inflation expectations	**Inflation**	0.499	n/a	n/a	Dropped at the Granger stage
ISM Manufacturing PMI	**Inflation**	0.517	n/a	n/a	Dropped at the Granger stage
Federal funds rate (12-month change)	**Inflation**	0.735	n/a	n/a	Dropped at the Granger stage

Each test asks whether the two lags of a candidate jointly help predict the target variable, given all other variables in the system. Round 1 includes every candidate for each model. Round 2 re-estimates each system after removing candidates dropped in round 1. ISM New Orders was evaluated only in out-of-sample tests. Sample: December 1997 to July 2026.

Out-of-sample testing. We used an expanding window. The first model was estimated on December 1997 to December 2009 data. We then re-estimated the model every month and produced forecasts 1 to 9 months ahead, for a total of 199 forecast origins from December 2009 to June 2026. At each origin, the model used only data available up to that month. Dummies that were all zero in the training window were dropped, and future shock dummies were set to zero.

We compared each specification with two benchmarks: a random walk, which assumes the latest value stays unchanged, and an AR(2) model, which uses only the target's own history. Accuracy is measured by root mean squared error (RMSE) relative to the random walk (Table A4). We report results with and without target months from March 2020 to December 2021, because the pandemic period dominates the errors.

Table A4. Out-of-Sample Forecast Accuracy (RMSE Relative to the Random Walk; Lower Is Better)

Specification	6-month full sample	9-month full sample	6-month ex-COVID	9-month ex-COVID
Growth model (target: ISM Manufacturing PMI)				
Random walk (benchmark)	1.000	1.000	1.000	1.000
AR(2) on PMI	0.923	0.882	0.917	0.878
VAR: Base (PMI, Baa spread, Core CPI, ISM Backlog, ISM Customers' Inventories)	0.946	0.894	1.015	0.955
VAR: Base + initial jobless claims	1.039	0.982	1.062	1.019
VAR: Base + New Orders	0.935	0.869	1.004	0.947
VAR A: PMI, New Orders, Baa spread, Core CPI	0.941	0.861	0.965	0.939
VAR B: A with ISM New Orders in place of core capital goods orders	1.025	0.919	1.026	1.006
VAR A without post-2021 dummy	0.959	0.863	0.940	0.941
Final: 50/50 average of AR(2) and VAR A without post-2021 dummy	**0.839**	**0.766**	**0.826**	**0.762**
50/50 average of AR(2) and VAR Base + New Orders	0.828	0.755	0.837	0.762
Inflation model (target: Core CPI, YoY)				
Random walk (benchmark)	1.000	1.000	1.000	1.000
AR(2) on Core CPI	1.222	1.244	1.169	1.279
VAR: Core CPI, M2, velocity	1.100	1.047	1.082	1.091
VAR: Core CPI, M2, velocity + WTI crude oil	1.098	1.044	1.075	1.085
VAR: Core CPI, M2, velocity + PPI intermediate materials	1.120	1.081	1.111	1.140
Final: VAR Core CPI, M2, velocity without post-2021 dummy	**0.908**	**0.832**	**0.921**	**0.846**
Final VAR + WTI crude oil (no post-2021 dummy)	0.907	0.834	0.914	0.843
50/50 average of random walk and final VAR	0.934	0.893	0.930	0.885

Each entry is the model's RMSE divided by the random walk's RMSE at the same horizon. Below 1.000 means the model beats the random walk; values above 1.000 are in red. Expanding window: first estimation window December 1997 to December 2009, 199 forecast origins, horizons 1 to 9 months. Ex-COVID drops target months March 2020 to December 2021. All VAR and AR(2) specifications include the eight pulse dummies. Unless noted, VAR specifications also include the post-2021 level dummy. Base = PMI, Baa spread, Core CPI, ISM Backlog, ISM Customers' Inventories. New Orders = core capital goods new orders (YoY).

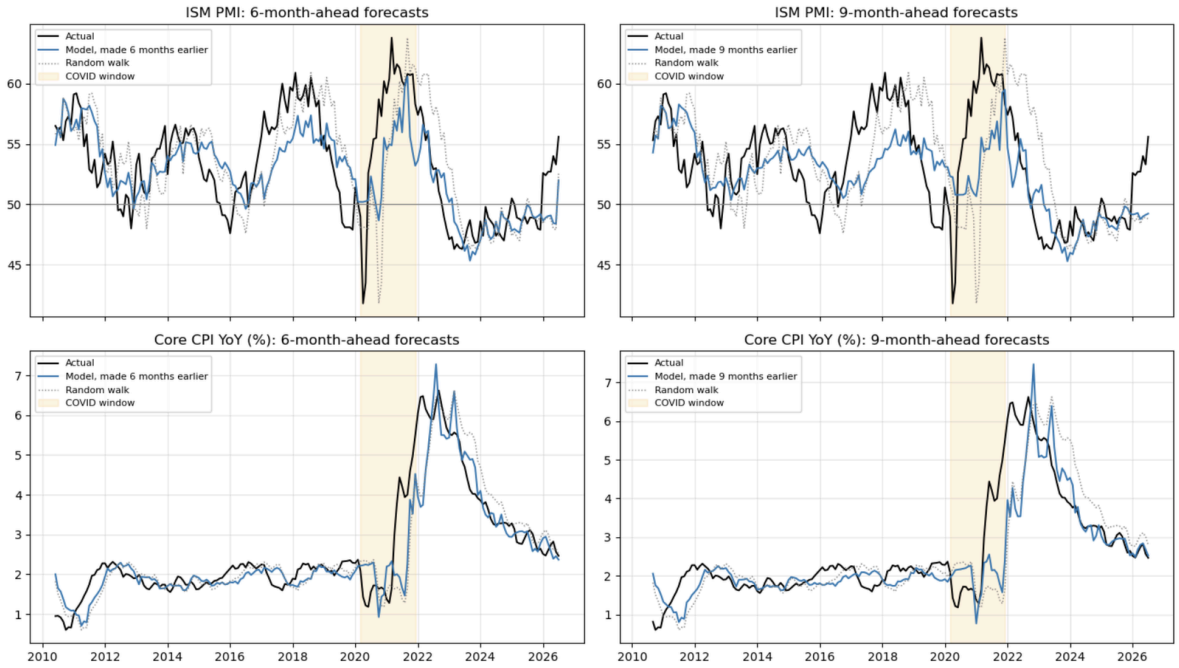
Three decisions follow from these tests.

1. **Averaging for the growth model.** No single VAR consistently beat the AR(2) at the 6- and 9-month horizons. However, averaging the AR(2) with the VAR reduced errors further, because the two models make different kinds of errors. The final growth forecast is an equal-weight average of the two. The AR(2) component keeps the post-2021 level dummy used in its benchmark tests.
2. **No post-2021 dummy in the inflation model.** A level dummy for the period after January 2021 caused the model to treat high inflation as a new normal. It then over-forecast inflation as inflation fell in 2023 to 2025. Removing it turned the model from losing to the random walk into beating it.
3. **No oil prices or PPI in the inflation model.** Adding WTI made almost no difference, and adding PPI made forecasts worse. Averaging the VAR with the random walk also made forecasts worse, so the final inflation forecast uses the VAR alone.

E. Backtesting

Figure A2 compares the final models' out-of-sample forecasts with actual outcomes. Three patterns stand out.

Figure A2. ISM PMI and Core CPI: 6- and 9-Month-Ahead Out-of-Sample Forecasts



First, the models capture the direction of the cycle but smooth its extremes. The PMI forecasts follow the 2016 to 2018 upswing and the 2022 to 2024 decline, but they stay below the actual peaks and above the actual troughs. This is typical of a model that pulls forecasts toward the long-run average. It is also why the model beats the random walk: the random walk repeats the value from 6 or 9 months earlier, so it is always late at turning points.

Second, the inflation model adds the most value when Core CPI is trending. During the 2023 to 2025 disinflation, the model's forecasts sit closer to the actual path than the random walk, which stays too high because it lags a falling series. In the stable 2010 to 2019 period, the two are almost the same.

Third, neither the models nor the random walk anticipate sudden shocks. Both missed the COVID collapse in PMI and the 2021 surge in Core CPI, and the inflation model then overshot the 2022 peak. More recently, the growth model's forecasts made in the second half of 2025 stayed just below 50, while actual PMI rose into the mid-50s by mid-2026. This suggests that part of the current strength comes from forces outside the model, which we discuss in "What Might Be Missing from the Models."

> **Limitation.** This is a pseudo real-time exercise. We used today's revised data, not the data that were available at each forecast date. Series such as PCE and New Orders are often revised, so the backtest results may be somewhat better than what a forecaster would have achieved in real time.

DISCLOSURES

This report was prepared by Sonny Xi for informational purposes only and does not constitute investment advice or a recommendation to buy or sell any security.

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Sonny Xi is an independent investment researcher covering equities and macro, with a focus on rates and geopolitics. His work pairs bottom-up company valuation, such as the three-scenario DCF framework used in his equity reports, with top-down macro analysis.

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SELECTED RESEARCH

- Meta Platforms, Inc. (META): equity research report, October 2026
- CME Group Inc. (CME): equity research report, October 2026
- Amazon.com, Inc. (AMZN): equity research report, October 2026
- The Ensign Group (ENSG): sell recommendation
- H2 2026 Macro Outlook
- VAR macro forecasting model (this report)
- Constructing a Portfolio for a Five Percent Return Objective

ANALYST CERTIFICATION

The views expressed in this report accurately reflect the personal views of the analyst about the subjects covered in this report. This report is independent research and was not commissioned or paid for by any company or third party.