

US Economy Barometer: Forecast Methodology

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1 Overview

The forecasts published at the top of usbarometer.com cover four headline measures of the US economy:

1. **CPI inflation:** year-over-year growth of the Consumer Price Index, 12 months ahead;
2. **Unemployment rate:** 12 months ahead;
3. **Real GDP growth:** average annualized quarter-over-quarter growth over the next four quarters;
4. **Real wage growth:** year-over-year growth of CPI-deflated usual weekly earnings of full-time workers, four quarters ahead, separately for the 10th percentile, the median, and the 90th percentile of the earnings distribution.

Forecasts are updated monthly as new data are released. Each is a weighted average of several forecasting models, with weights and uncertainty ranges calibrated from a two-decade out-of-sample evaluation described in Section 6.

2 Data

The models use about two dozen series obtained directly from primary sources (Bureau of Labor Statistics, Bureau of Economic Analysis, Federal Reserve Board, U.S. Census Bureau, University of Michigan Surveys of Consumers, Freddie Mac, U.S. Treasury, U.S. Department of Labor). The estimation sample begins in January 1978; series with later start dates (e.g., JOLTS, retail sales, wage percentiles) enter with missing early values.

Group	Series	Frequency
Prices	CPI all items, core CPI	monthly
Labor	unemployment, U-6, payrolls, hours, earnings, involuntary part-time work, JOLTS openings and quits, initial UI claims	monthly
Activity	industrial production, capacity utilization, retail sales, building permits	monthly
Surveys	consumer sentiment, median 1-year inflation expectations	monthly
Financial	30-year mortgage rate, 10y–3m and 10y–2y Treasury spreads	monthly
Output	real GDP growth (% SAAR)	quarterly
Wages	usual weekly earnings, p10/median/p90, CPI-deflated	quarterly

Price and quantity indexes enter as log-differences, rates as first differences, spreads and expectations in levels; the not-seasonally-adjusted claims series enters as a 12-month log-difference. Known collection gaps (October 2025; 2025Q4 wage percentiles) are left as missing values, which every model below accommodates.

3 Component models

Dynamic factor model (DFM). A mixed-frequency dynamic factor model in the spirit of the Federal Reserve Bank of New York’s nowcasting model, estimated by the EM algorithm (statsmodels `DynamicFactorMQ`). Two factor blocks are used — a global factor loading on all series and a nominal factor loading on prices, wages, and inflation expectations — each following an AR(2), with AR(1) idiosyncratic components. Quarterly series are linked to the monthly factors through the standard Mariano–Murasawa aggregation. Because the pandemic collapse would otherwise dominate the estimated loadings, activity-series observations for March–July 2020 are treated as missing during estimation.

Gradient boosting (GBM). A gradient-boosted tree model¹ estimated separately for each target and horizon (“direct” forecasting), with conservative, fixed hyperparameters. Features are lags $\{0, 1, 2, 3, 6, 12\}$ of every panel series plus a small set of engineered variables (current inflation, recent unemployment changes, payroll growth, term spreads, calendar month, and a pandemic indicator). The unemployment rate is modeled as the *change* from its current level, since tree models cannot extrapolate a trending level. Features and targets are winsorized at pre-2020 percentiles. The GBM is excluded for the wage targets, whose quarterly sample (2000–present, roughly 105 observations) is too short to train it responsibly.

Autoregressive benchmark (AR). For each target and horizon, an OLS projection of y_{t+h} on a constant and 12 monthly (4 quarterly) lags of the target.

Naive benchmark. The most recent value (inflation, unemployment) or the expanding historical mean (GDP and wage growth).

4 Forecast combination

For each target and horizon, the published forecast is an inverse-MSE weighted average of the component models, with MSEs measured in the out-of-sample evaluation below. Components with an MSE more than four times the best component’s are dropped (weight zero). The naive benchmark is a full member of the ensemble: year-ahead GDP and real-wage growth are genuinely difficult to forecast better than their historical means, and the weighting shifts toward the mean precisely where that is true.

5 Uncertainty ranges

The 68% and 90% ranges are the empirical 16th/84th and 5th/95th percentiles of the combined forecast’s out-of-sample errors at each horizon, applied around the point forecast and constrained to widen (never narrow) with the horizon. Asymmetries in historical errors — for example, unemployment surprises are predominantly to the upside — are preserved rather than symmetrized.

¹scikit-learn’s `HistGradientBoostingRegressor`.

6 Out-of-sample evaluation

The combination weights and uncertainty ranges come from an expanding-window pseudo-out-of-sample backtest with monthly forecast origins from January 2005 (quarterly targets evaluated at quarter ends; wage targets from 2010 to allow a training sample). At each origin, every series is truncated according to its typical publication lag, mimicking the ragged edge of real-time data. The DFM and GBM are re-estimated at each January origin and updated with new data between re-estimations; the cheap benchmarks are re-estimated every origin. Forecast target dates falling in March 2020–June 2021 are excluded from all error statistics.

Root-mean-squared errors at the headline horizons:

Target (headline horizon)	Ensemble	AR	Naive	Ratio to AR	n
CPI inflation (12m)	1.90	2.00	2.32	0.95	228
Unemployment rate (12m)	1.10	1.04	1.24	1.06	228
Real GDP growth (4q)	2.54	2.69	2.46	0.94	75
Real median wage growth (4q)	1.84	2.27	1.79	0.81	54
Real p10 wage growth (4q)	1.83	2.12	1.93	0.86	54
Real p90 wage growth (4q)	2.25	2.35	2.28	0.96	54

The ensemble outperforms the autoregressive benchmark for five of the six headline measures and outperforms it at nearly all shorter horizons as well. The exception is the unemployment rate at horizons of 10–12 months, where the AR benchmark is about 6% more accurate; the difference is not statistically significant (Diebold–Mariano $p = 0.34$). For year-ahead GDP and median wage growth, the historical mean remains marginally more accurate than the ensemble — a well-known feature of these series — which is why it receives substantial weight in the combination.

7 Track record: 2025–2026

A concrete illustration of how the ensemble would have performed recently: the table below evaluates its year-ahead forecasts for target dates in 2025 and the first half of 2026, made from backtest origins in 2024 and early 2025 (each using only the data and model estimates that would have been available at the time). Bias is the mean forecast error (positive = forecast too high).

Target	n	RMSE	Bias	In 68% range	In 90% range
CPI inflation (12m ahead)	15	0.68	+0.5	15/15	15/15
Unemployment rate (12m ahead)	15	0.31	+0.3	15/15	15/15
Real GDP growth (4q ahead)	4	2.21	+0.4	2/4	4/4
Real median wage growth (4q)	3	1.46	−1.4	1/3	3/3
Real p10 wage growth (4q)	3	1.29	+0.4	2/3	3/3
Real p90 wage growth (4q)	3	1.87	+1.3	2/3	3/3

The period was kind to the monthly forecasts: inflation errors averaged well under a point (including forecasts made in spring 2025 that essentially anticipated the spring 2026 pickup), and the unemployment forecasts called the direction of the 2025 drift upward while somewhat overstating its size. Quarterly GDP illustrates the opposite lesson — the model missed both the 2025Q1 contraction and the Q3 surge, as did every benchmark — which is why the site’s GDP headline is a four-quarter average with a wide range. All outcomes fell inside the 90% ranges. That every monthly outcome also fell inside the 68% range mainly reflects a comparatively calm window relative to the 2005–present errors the ranges are calibrated on.

Two qualifications: the combination weights are estimated on the full evaluation sample, so this recent window is not fully out-of-sample for the *weights* (the component forecasts themselves are); and the small quarterly counts reflect the October 2025 federal data gap and the evaluation design. A live track record — forecasts published on the site versus subsequent data — accumulates from August 2026 onward and will be reported here as it builds up.

8 Limitations

The evaluation uses today’s (revised) data with stylized publication lags rather than true real-time vintages, so measured accuracy is somewhat optimistic — particularly for GDP, which is revised substantially. The models extrapolate historical patterns and cannot anticipate wars, pandemics, financial crises, or abrupt policy changes. Roughly one forecast in three should be expected to fall outside the 68% range; that is what the range means.

The forecasts are refreshed monthly; the combination weights and uncertainty ranges are re-estimated annually. Code and data sources are described at usbarometer.com/methodology.html.