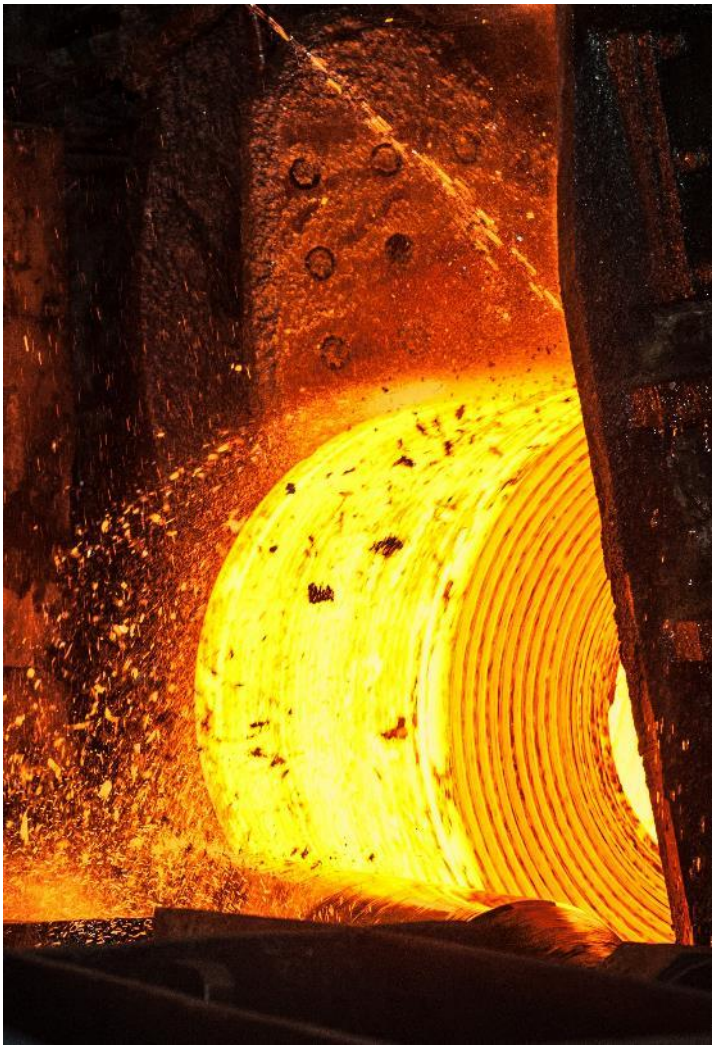


Steel & Industrial Production Forecasts

2017-2022

SEEGMM

The Steel Econometric Ensemble Gauss Markov Model

Lone Star Analysis

Steel and Industrial Production Forecasts through 2022

Introduction

This report delivers four forecasts through 2022, for steel and industrial production. The report is provided as a free service by Lone Star Analysis. Lone Star offers a wide range of modeling, simulation and analysis solutions.

The forecasting tool is a Lone Star Analysis proprietary system called SEEGMM (Steel Econometric Ensemble Gauss Markov Model).

Lone Star provides our clients with a wide range of analytical tools, analysis, and services. SEEGMM is one example of our work. Please see our website for more about Lone Star (www.Lone-Star.com).

Overview

Growth in the world economy, North American economy and the US economy are likely to result in higher industrial output and higher steel prices. We estimate:

- World steel production will increase about 14% over 2016 levels by year end 2022.
- North American steel production will increase by nearly 8%.
- U.S. Industrial production will increase more than 7%.
- U.S. Steel prices will rise more than 13% over this forecast period.

Our forecasts are probabilistic, with the estimates above being the median value (P50).[1]

Our median forecasts for 2017 suggest that economic reporting to date may be understating the rate of economic growth in the U.S. including upward pressure on steel producer price indices, and that official government statistics seem likely to be revised upwards.

Generally, this growth seems more likely to occur in the near term, with growth moderating later in the forecast period.

The forecast with the largest uncertainty is world steel production. The central 60% (P30 to P70)[2] range for this forecast ranges from a 14% decline by 2022, to more than 40% growth.

Roughly, the odds of world steel production growing are 2:1.

The forecast with the least uncertainty is North American steel production. The central 60% (P30 to P60) range for this forecast ranges from about a 6% decline, to about a 20% increase, with the odds of growth being roughly 3:1.

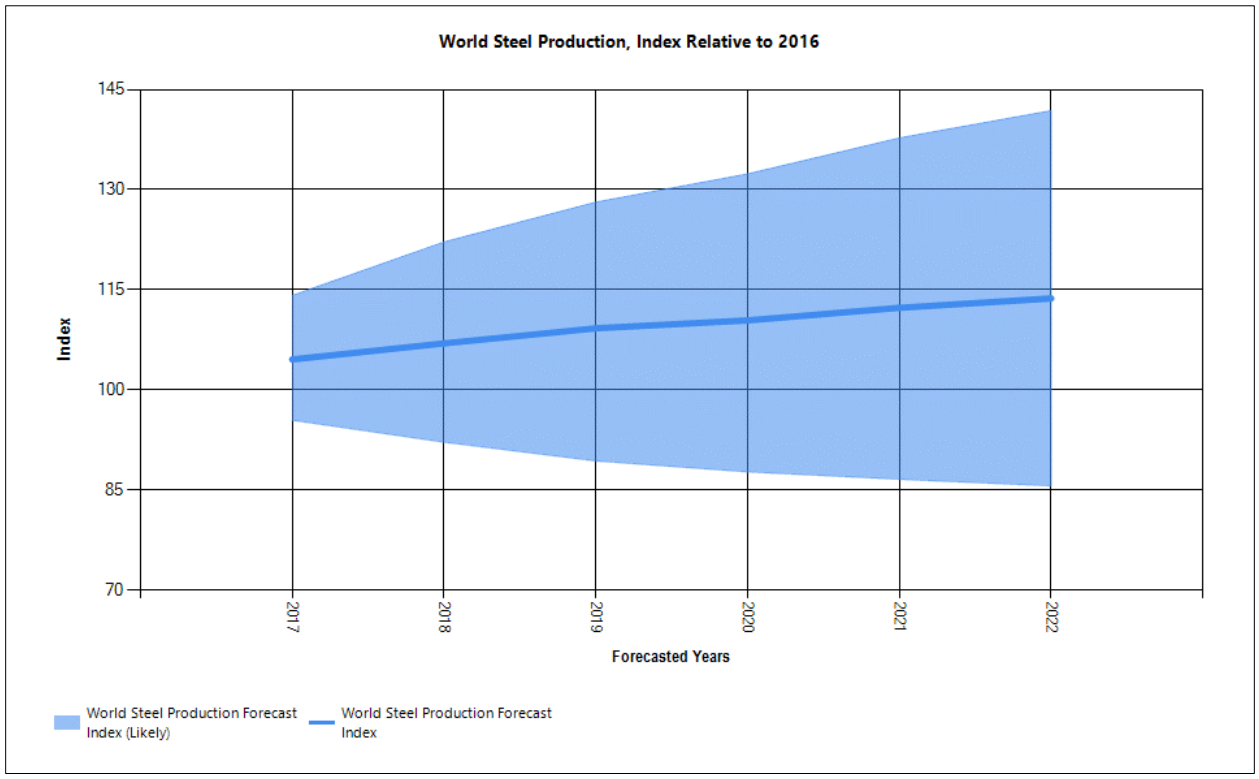
The balance of this report presents detailed Results (page 2) and a discussion of Forecasting Methods (page 4).

[1] P50 is the estimate which is "median" with half of forecasts being greater, and half being less.
[2] P30 means the forecast value which is greater than 30% of the estimates, and P70 means the forecast value which is greater than 70% of the estimates.

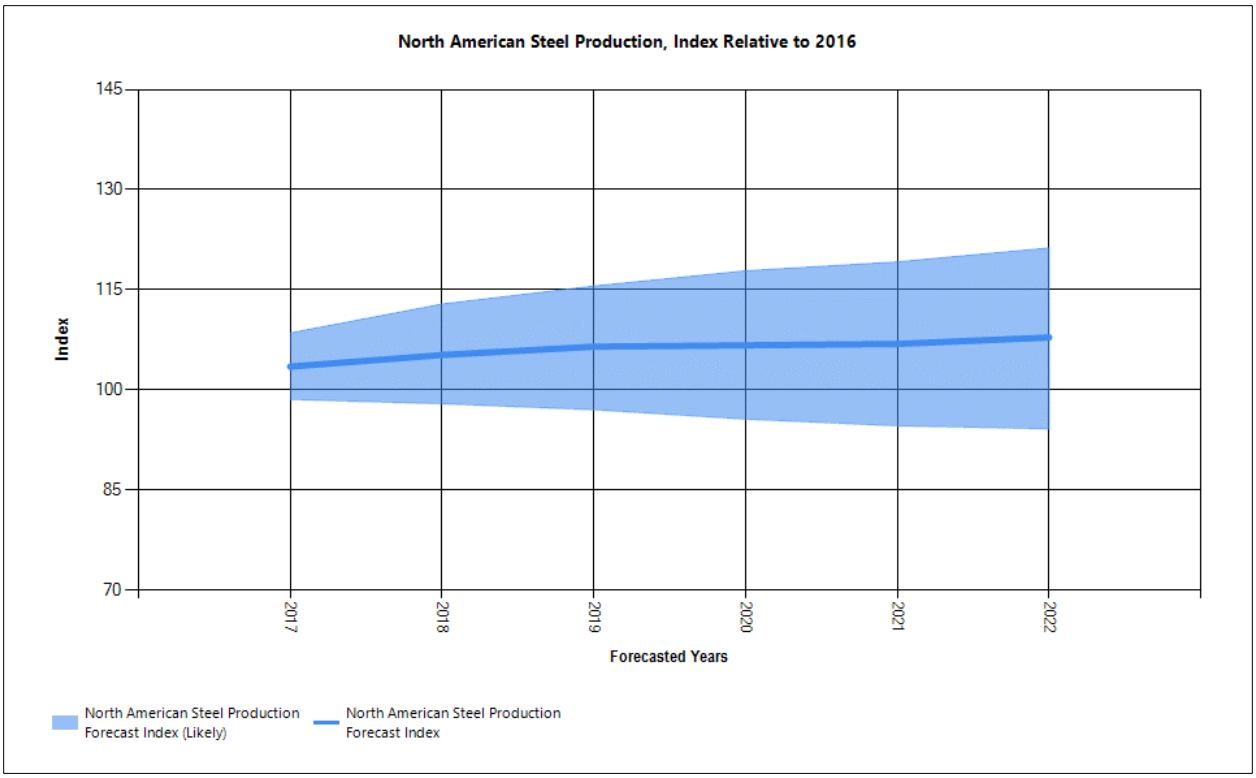
Detailed Results

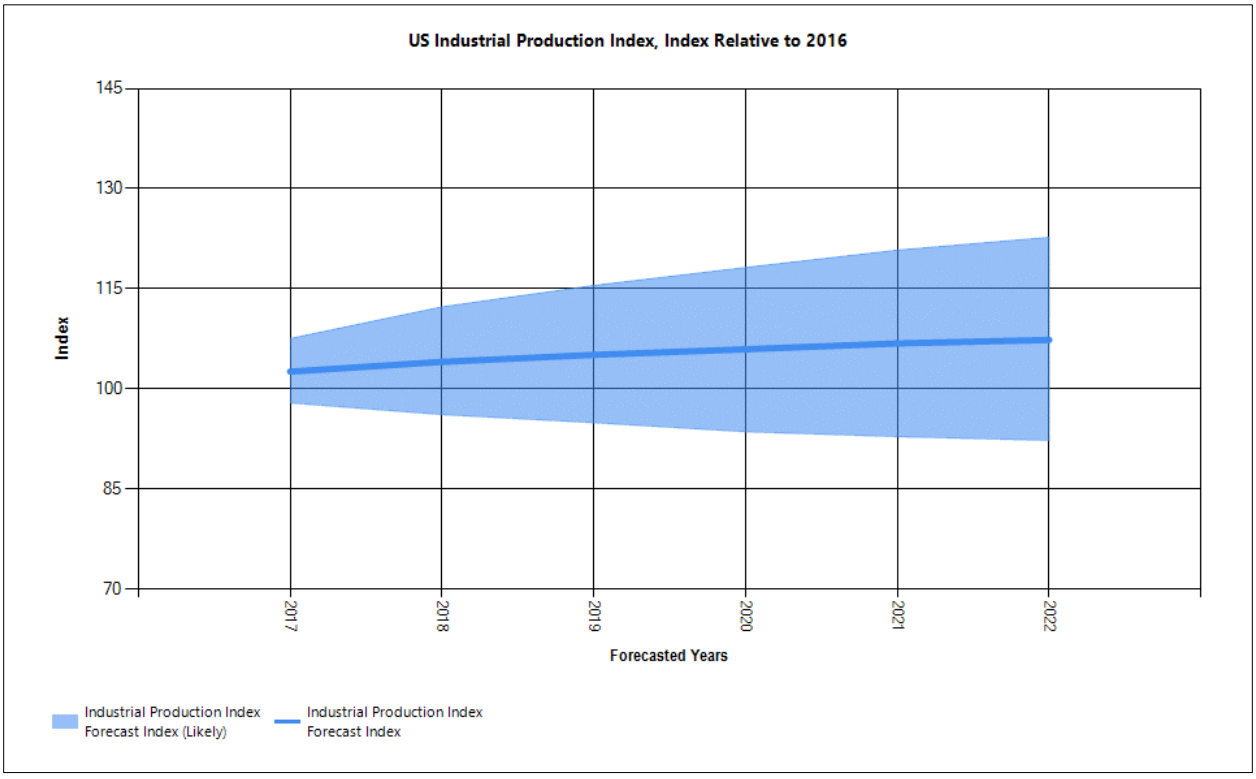
Each SEEGMM forecast is scaled to the year 2016. Because this forecast was conducted during 2017, 2017 is a forecast. Official statistics for 2017 are incomplete. For example, the Bureau of Labor Statistics Producer Price Index[3] was finalized through July 2017, with all later data being provisional at the time this report was written.

Each of the following charts shows SEEGM forecasts. In each case the median prediction (P50) is shown as a line, with the central band of uncertainty spanning 60% shown around the line. This range is deemed the "likely" range, and the extreme tails of the uncertainty are not shown.



[3] See https://www.bls.gov/regions/mid-atlantic/data/producerpriceindexmetals_us_table.htm


North American Steel Production, Index Relative to 2016
145
130
115
100
85
70
Index
2017
2018
2019
2020
2021
2022
Forecasted Years
North American Steel Production Forecast Index (Likely)
North American Steel Production Forecast Index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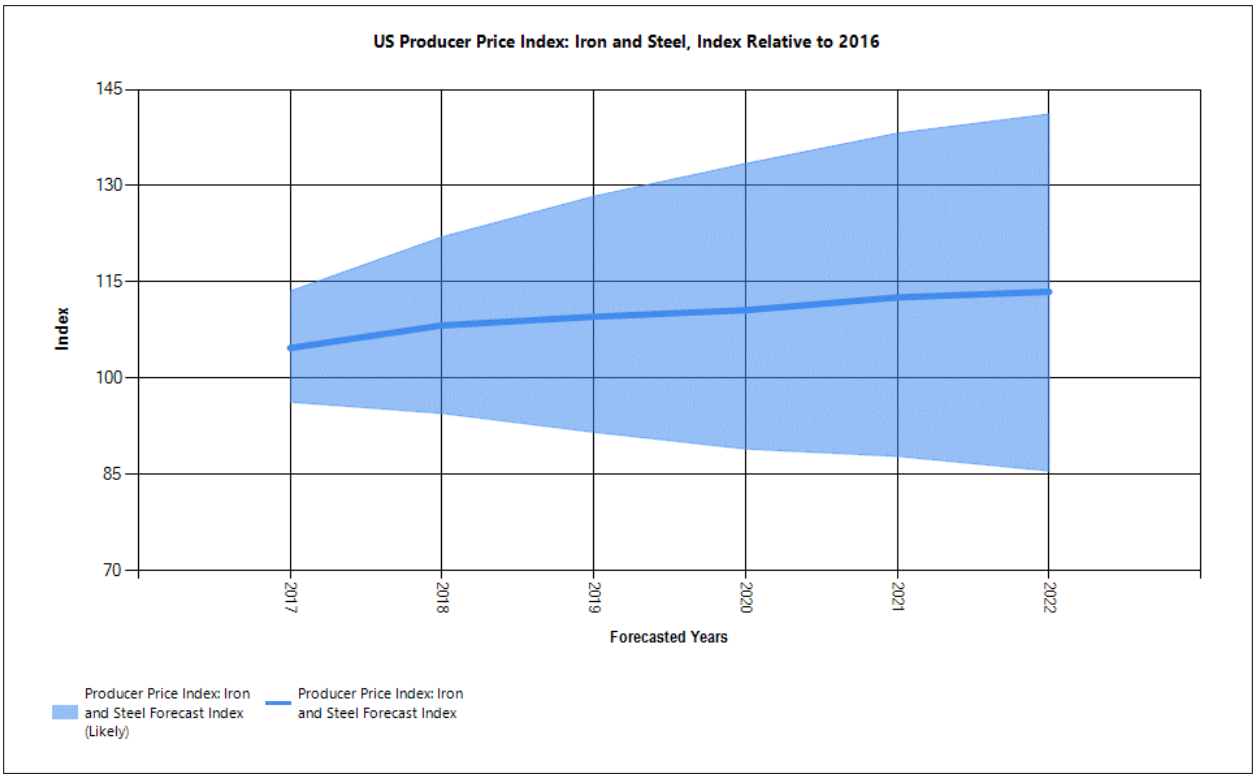

Forecasting Methods

Lone Star uses a wide range of forecasting methods. Our economic and econometric work ranges from assessments of individual economic competitions (bids and auctions or "Price to Win"), to buyer-seller economic behavior forecasting, to market and demand forecasting.

We produce hundreds of customized predictions for our clients. Most of these forecasts are closely held. These represent about 30% of Lone Star's business.

SEEGMM is provided freely to demonstrate one of Lone Star's offerings. However, the methods we choose for our clients vary widely.

SEEGMM is an Econometric Gauss Markov Regression ensemble. The model is based on observed economic relationships and derived from objective data. It is an "Ensemble" because each forecast is a combination of several individual forecasts, and, the "ensemble" is the collection of these forecasts.

Using this approach, SEEGMM provides annual forecasts six years in the future. Like weather forecasts (70% chance of rain) SEEGMM deals in probabilities.

SEEGMM was constructed using Lone Star's TruNavigator® tool suite. TruNavigator Model Builder was used to construct, edit, and audit SEEGMM.

Each of the four forecasts in the SEEGMM ensemble is comprised of 10,000 individual forecasts over the six-year period, or a total of 60,000 year forecasts for each topic 240,000 annual forecasts in total).

Each forecast is based on observed historic relationships modeled using statistical regression methods (Gauss Markov). Each of these historic relationships is used to create a forecast. These are projected forward by loading forecasts of input variables from open, official sources.

Approximately 200 economic factors were considered for each of the four forecasts, with fewer than a dozen chosen for each ensemble, representing those with the most predictive power.

Each ensemble component (sub model) is then estimated 10,000 times for each annual forecast.

These component sub models are then combined.

Each ensemble is created by randomly drawing one of the component forecasts for each of the 10,000 samples which define a year. The proportion of draws is determined by the historically predictive power of the economic factor. An ensemble with six sub-models might be composed of 30% from the best predictor, and then 25%, 15%, and 14%, 9%, and 7%. In this case, the best sub-model would be drawn 3000 times (30% x 10,000) and least used model would be drawn 700 times (7% x 10,000).

This approach is in keeping with the best practices of market and economic forecasting.[4]

For More Information

If you would like more information about these forecasts, or if you are interested in custom forecasting for your markets please contact us. Info@Lone-Star.com

[4] Lone Star personnel led the global Modeling Best Practices Benchmarking Project.