

## US Money Supply

12/08/2025

The money supply is defined as a category of safe assets that can be used immediately to make payments or to hold as short-term investments (for earning short-term interests). Examples are cash and balances held in bank's checking and savings accounts. An important measure of money supply is M2 money. M2 money is M1 money plus small-denomination deposits and retail money market mutual fund shares. M1 money in turn is the sum of money held by the general public and transaction deposits at depository institutions (e.g., banks). Measures of the money supply may exhibit significant relationships with other economic measures such as GDP and CPI; therefore they play an important role in the monetary policy making process.

The Board of Governors of the Federal Reserve System publishes weekly M2 money supply through the Federal Reserve Economic Data (FRED) database. This article uses M2 data downloaded from FRED available at <https://fred.stlouisfed.org/>.

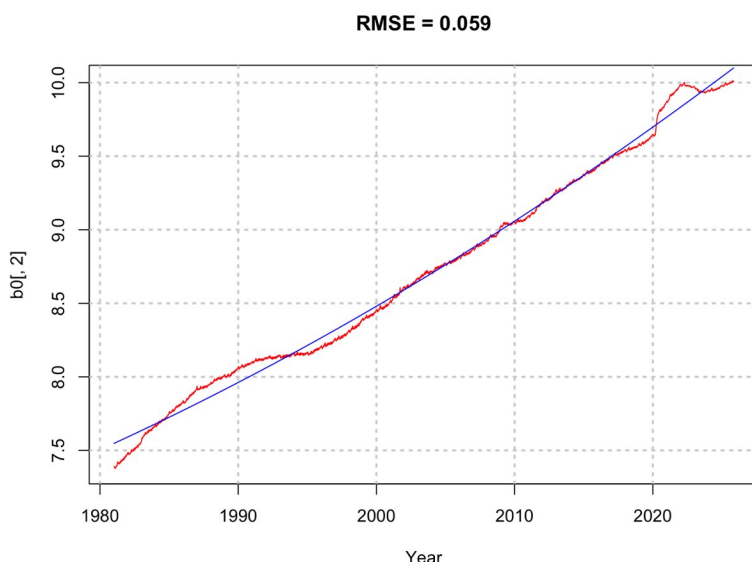


Figure 1, Logarithmic M2 Money Supply (red) and the General Trend Line (blue) using a Linear Model.

The downloaded data was first transformed into the logarithmic form to help “regularize” the data that otherwise span over a large range. Figure 1 shows the data and a linear fit. The overall trend shows that the US money supply increases steadily over the time; yet a drastic increase in money supply was found in 2020 to stimulate the economy during the global pandemic. The seasonality of the data is modeled using the Fourier transformation. Figure 2 shows the spectrogram of the residual term from the trend model.

Several important frequency components are located at frequency indexes of 4, 7, and 13 corresponding to seasonalities of  $2340/52/4 = 11$  years,  $2340/52/7 = 6$  years, and  $2340/52/13 = 3$  years. The Fourier transformation therefore includes all the frequency components whose index is below 13. Figure 3 shows the modeling result. The RMSE decreases from 0.059 to 0.014, a significant improvement. These multi-year seasonality cycles perhaps describe the irregular changes in money supply as shown in Figure 1.

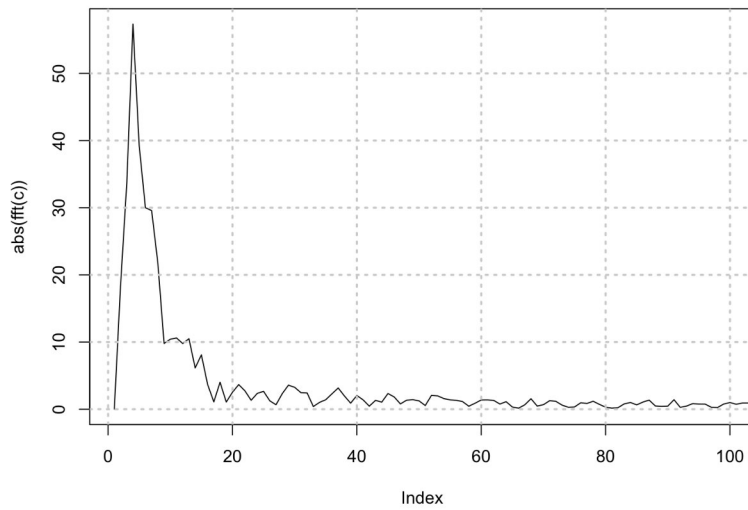


Figure 2, Fourier Transformation of the Residual Term from the Trend Model.

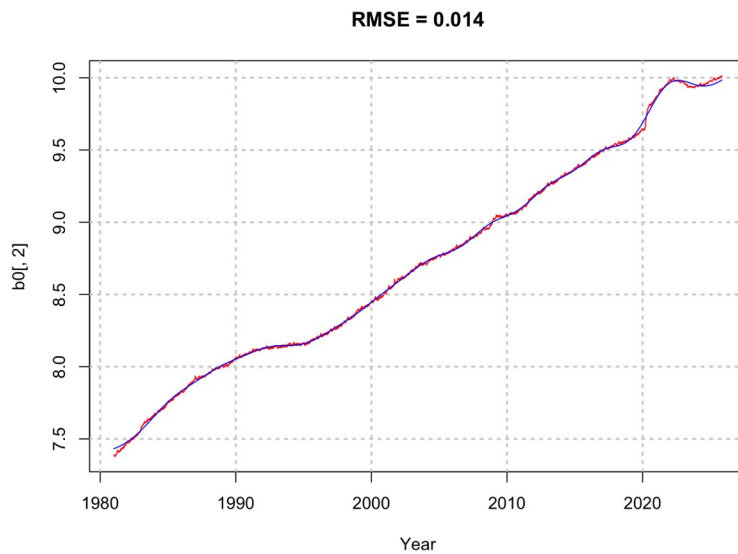


Figure 3, Logarithmic M2 Money Supply (red line) and Model of both the Trend and Seasonality (blue line).

The partial autocorrelation function (PACF) of the residual term from the seasonality model is shown in Figure 4. It suggests that the money supply of one week is correlated to those many weeks prior, or a long memory of the past history. These contributing weeks (total 14) are then included into the autoregression model of the residual term. The autocorrelation over many weeks in the data may also suggest the inherent randomness of the data from one week to another, caused by millions of market participants who put in or take out money to or from the market based solely on their own wills.

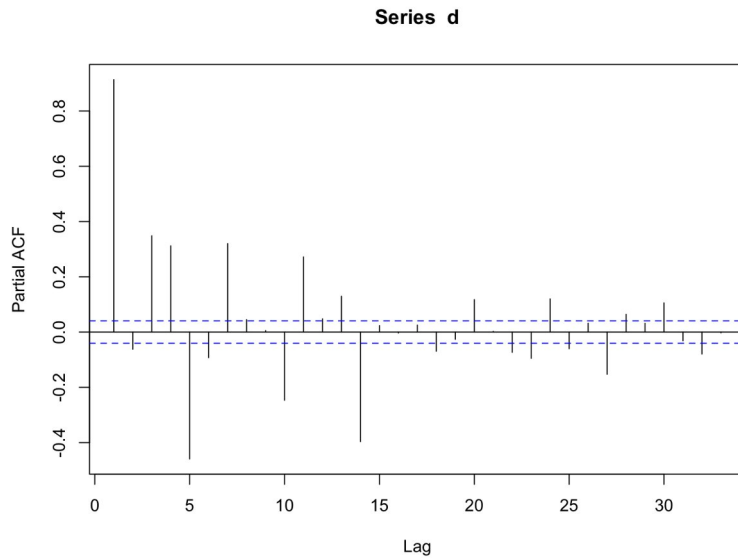


Figure 4, Partial Autocorrelation Function of the Residual Term (d) from the Seasonality Model.

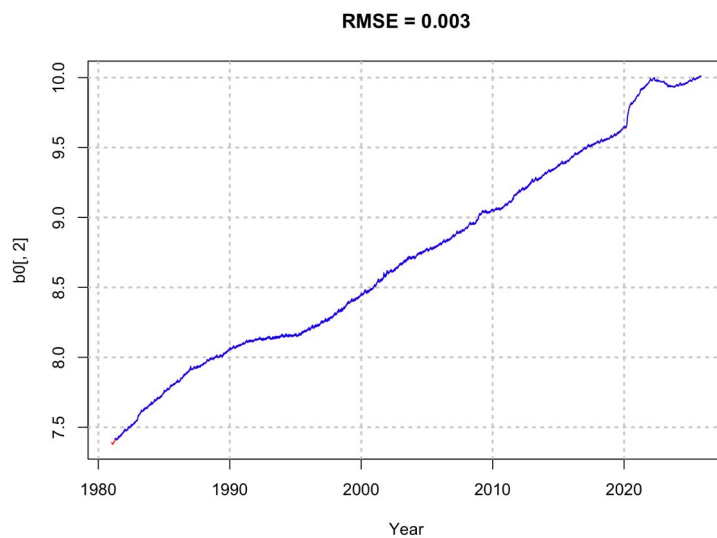
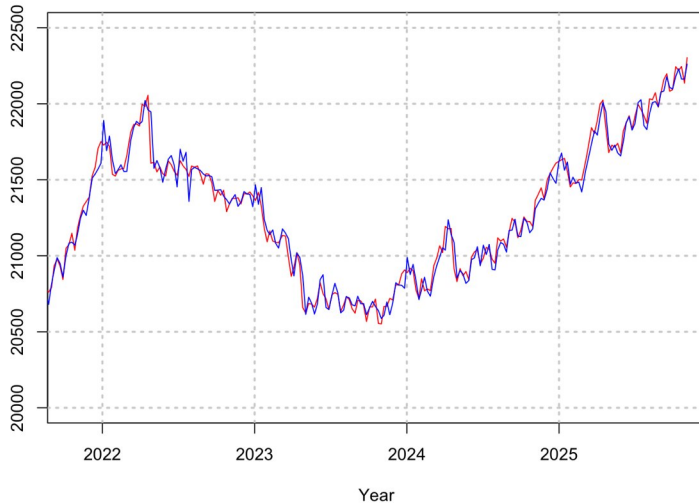


Figure 5, Combined Model with Trend, Seasonality, and Autoregression Components.

The combined model is shown in Figure 5. The RMSE of the combined model further reduces from 0.014 to 0.003. A closeup view of the model is also shown in Figure 6 for the M2 money supply (in Billions, converted back from the logarithmic representation) for the recent years. It clearly shows that after a steep monetary tightening period in later part of 2022 and early part of 2023, the money supply resumes its “secular” increase starting 2024 and continues into 2025. The week-to-week change remains to be chaotic or “random”, yet the monetary easing trend is unmistakably here to stay.



*Figure 6, A Closeup View of Figure 5 of M2 Money Supply (Billions, red line) and Model Prediction (blue line)*

### Concluding Remarks

Two major money supply cycles occurred in the past with important lessons. One cycle started with the monetary easing after the 1980 recession. This increase in money supply was effective but apparently went too long. When the money supply was finally halted in 1990, a brief recession started and the monetary tightening might or might not be a factor. The other cycle is the drastic increase in money supply in 2020. This time around, the monetary easing period was not too long in comparison with that during 1980 -1990, but the rate of the increase was too fast and triggered an inflation. The brake on the money supply was pressed in 2022 followed by a rapid monetary tightening. The money supply became steady in later part of 2023 before the resumption of money supply increase starting at the end of 2023.

A small cycle of money supply is also found during 2009 recession. However, because loose financial regulations and perhaps money supply were blamed to have triggered the 2008 “great financial crisis” (GFC), this cycle was short in duration and small in magnitude.