5.4: Forecasting

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Motivation

After you've estimated the models parameters, you can use those to forecast future data with one of the algorithms we learned in 3.3. That's what this chapter is about.

We skipped section 3.3, however, so we won't be deriving our predictors specifically using the innovations algorithm.

Example 5.4.1

We are assuming the estimated model is true here.

$$X_t + 4.035 = Z_t - .818Z_{t-1}$$

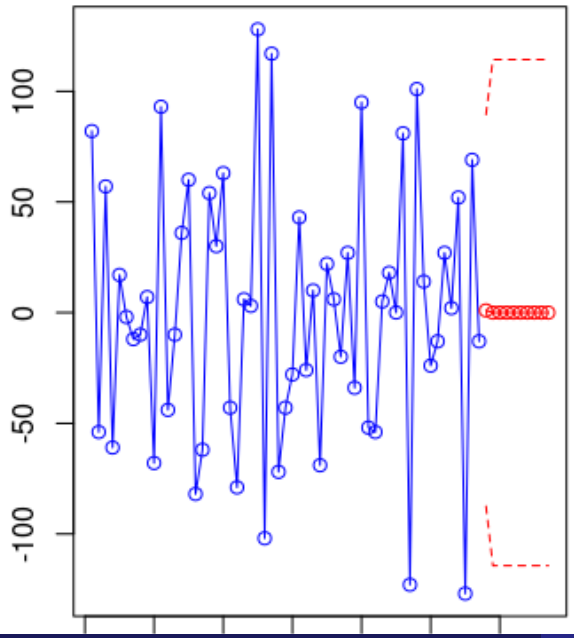
Then

$$\begin{aligned}\hat{X}_{t+h} &= -4.035 + E[Z_{t+h}|X_{1:t}] - .818E[Z_{t+h-1}|X_{1:t}] \\ &= \begin{cases} -4.035 - .818(X_t - \hat{X}_t) & h = 1 \\ -4.035 & h > 1 \end{cases}\end{aligned}$$

Example 5.4.1

See code handout for more details.

```
> forecast(x = x, xv = NULL, a = mod, opt=2)
 Step      Prediction       sqrt(MSE)     Lower Bound     Upper Bo
    1        1.003845        45.15743       -87.50472        89.51
    2    8.715312e-16        58.34096       -114.3483        114.3
    3    8.715312e-16        58.34096       -114.3483        114.3
```



Out-of-Sample Prediction

In finance, you are usually primarily concerned with out-of-sample forecasting. Here are some things to consider:

1. You are always uncertain about the model (more on this next chapter)
2. Even if you have the model right, your estimates for the parameters are random and are going to be off.
3. Even if you have the right model and parameters, there is no reason for this to be a good model forever.

Theoretically more data usually solves the first two problems. However, *in practice* more data magnifies the third problem.