**Check on the MSE calculation of the Stable Model (& the Lasso Model)**

The MSE ratio is defined by , where refers to the constant model, and the to the Stable model or the Lasso model. The MSE’s themselves are calculated by the conventional definition: , where indicates a certain model, and is the total number of predictions for that model ( is the real data, and is the forecast, sometimes is missing while presents, and this case will not be counted).

Now, it is possible that and are different, and it should be always be the case that , because the constant model takes the rolling average as prediction, and so the prediction will never fail to show up if there is a valid 5-yr rolling window. However, for the Stable model, there exists certain weeks that no stable pairs pass the test; for Lasso model, there might be weeks that the selected variables have missing values (but coincidentally such case does not exist in the simulation, so the following paragraphs exclude Lasso case). Hence there might be discrepancies in across models.

To address this obscure problem in the MSE ratio calculation, we can take two approaches. The first is to ignore the mismatching in , and so

The other way is to first get rid of the constant model predictions which do not have a contemporaneous stable or Lasso prediction. In this way,

And

One of the implications from the second approach is that, the MSE ratio of the *Const Fillin Model* in the Stable model analysis will always be a weighted average of 1 and this *MSE Ratio Sub*. This is not always the case for the first approach, because it is possible that the stable model performs worse than the constant model in all the weeks where both predictions are valid, but then the constant model is more disastrous in the rest of the weeks, where there is no stable model forecast. The MSE ratio will be less than 1 here, but it doesn’t mean the existing stable model forecasts outperform those of the constant model, it is just because the missing parts are corresponding to way more inproper constant forecasts that drive up the MSE in the denominator. Hence when that part of constant model is filled in, the new MSE ratio will be greater than 1, not a weighted average of 1 and last MSE.

In the following table, the row named Stable Model Sub (SMS) adopts the second approach and the row Stable Model All (SMA) adopts the first one. And indeed, the Const Fillin Model values are the weighted averages of the SMS values and 1, whereas it is not true for SMA values.

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| 3 Year Stability Shrinkage Window | | | | | | | | |
| **3yr Stable Model sub** | 1.1037 | 1.0350 | 1.0957 | 1.0382 | 1.0843 | **0.8871** | 1.0704 | 1.1759 |
| **3yr Stable Model all** | **0.9188** | 1.3499 | **0.8965** | 1.0962 | 1.1414 | **0.8940** | 1.0023 | **0.9943** |
| **Const Fillin Model** | 1.0522 | 1.0327 | 1.0639 | 1.0331 | 1.0539 | **0.8925** | 1.0409 | 1.0367 |