Materials 5b - Revisiting the timing

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Define some objects:

$$f_t = \hat{\mathbb{E}}_t(z_{t+1}) \quad \text{one-period-ahead forecast formed at time } t \tag{1}$$

$$fe_t = z_{t+1} - f_t \quad \text{one-period-ahead forecast realized at time } t+1 \tag{2}$$

$$= ALM(t+1) - PLM(t+1) \tag{3}$$

$$\theta_t = \hat{\mathbb{E}}_{t-1}(z_t) - \mathbb{E}_{t-1}(z_t) \quad \text{CEMP's criterion} \tag{4}$$

$$= PLM(t) - \mathbb{E}_{t-1}\, ALM(t) \tag{5}$$

$PLM_1 : \hat{\mathbb{E}}_t z_{t+1} = \bar{z}_{t-1} + b s_t$

Then at time t available: $\bar{z}_{t-1}, s_t, k_{t-1}, f_{t-2}$

1. Form all future expectations using $PLM_1 \rightarrow$ z_t realized
2. Form $\theta_t \rightarrow k_t$ realized
3. Update $\bar{z}_t = \bar{z}_{t-1} + k_t^{-1}(fe_{t-1})$

   where $fe_{t-1} = z_t - f_{t-1} =$

   $fe_{t-1} = z_t - (\bar{z}_{t-2} + b s_{t-1})$, so:

   $\bar{z}_t = \bar{z}_{t-1} + k_t^{-1}(z_t - (\bar{z}_{t-2} + b s_{t-1}))$

$PLM_2 : \hat{\mathbb{E}}_t z_{t+1} = \bar{z}_t + b s_t$

Then at time t available: $\bar{z}_t, s_t, k_{t-1}, f_{t-2}$

1. Form all future expectations using $PLM_2 \rightarrow$ z_t realized
2. Form $\theta_t \rightarrow k_t$ realized
3. Update $\bar{z}_{t+1} = \bar{z}_t + k_t^{-1}(fe_{t-1})$

   where $fe_{t-1} = z_t - f_{t-1} =$

   $fe_{t-1} = z_t - (\bar{z}_{t-1} + b s_{t-1})$, so:

   $\bar{z}_t = \bar{z}_{t-1} + k_t^{-1}(z_t - (\bar{z}_{t-1} + b s_{t-1}))$

Issue # 1: Updating of $\bar{z}$ is in any case a function of last period's $\bar{z}$ (i.e. not the one available to use this morning) (unless you use an "assessment forecast": the $\bar{z}$ you used this morning with s_{t-1} you used yesterday).

The second issue will be about the criterion. Recall:

$$\begin{aligned}\theta_t &= \hat{\mathbb{E}}_{t-1}(z_t) - \mathbb{E}_{t-1}(z_t) \\ &= PLM(t) - \mathbb{E}_{t-1}\, ALM(t)\end{aligned}$$

Recall: $PLM_1 : \hat{\mathbb{E}}_t z_{t+1} = \bar{z}_{t-1} + bs_t$

$$ALM_t = \text{stuff} \times \bar{z}_{t-1} + \text{stuff} \times s_t$$

$$\theta_t = \bar{z}_{t-2} + bs_{t-1} - \mathbb{E}_{t-1}(\text{stuff} \times \bar{z}_{t-1} + \text{stuff} \times s_t)$$

Recall: $PLM_2 : \hat{\mathbb{E}}_t z_{t+1} = \bar{z}_{t} + bs_t$

$$ALM_t = \text{stuff} \times \bar{z}_{t} + \text{stuff} \times s_t$$

$$\theta_t = \bar{z}_{t-1} + bs_{t-1} - \mathbb{E}_{t-1}(\text{stuff} \times \bar{z}_{t} + \text{stuff} \times s_t)$$

Issue #2: I had this issue before, but it's not clear what the RE of $\bar{z}$ is. In particular, I don't know what the index of $\mathbb{E}_{t-1}$ refers to: the morning of $t-1$ or the evening?

- If it's the morning, then $\mathbb{E}_{t-1}(\bar{z}_{t-1}) = \bar{z}_{t-2}$

  $\to \theta_t = f(\bar{z}_{t-2}, s_{t-1})$

- If it's the evening, then $\mathbb{E}_{t-1}(\bar{z}_{t-1}) = \bar{z}_{t-1}$

  $\to \theta_t = f(\bar{z}_{t-2}, \bar{z}_{t-1}, s_{t-1})$

- If it's the morning, then $\mathbb{E}_{t-1}(\bar{z}_{t}) = \bar{z}_{t-1}$

  $\to \theta_t = f(\bar{z}_{t-1}, s_{t-1})$

- If it's the evening, then $\mathbb{E}_{t-1}(\bar{z}_{t}) = \bar{z}_{t}$

  $\to \theta_t = f(\bar{z}_{t-1}, \bar{z}_{t}, s_{t-1})$

The "evening" assumption isn't cool because the criterion depends on the intercept at several time periods, the "morning" assumption isn't cool because just like in Issue #1, we need access to yesterday morning's estimate of the intercept.

But one can use Ryan's PLM (PLM_1) in any case, because the issues are exactly the same, the notation is just different.