Discussion of James H. Stock and Mark W. Watson "Forecasting in Dynamic Factor Models Subject to Structural Instability"

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Outline

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Paper partly revisits Stock and Watson (1998):

- Diffusion index model based on time-varying loadings:

$$X_{it} = \Lambda_{it} F_t + e_{it}$$

with

$$\Lambda_{it} = \Lambda_{i,t-1} + h\upsilon_t; \quad h = diag(h_1 \cdots h_N) \quad \upsilon_t \sim N(0, I)$$

- One can ignore this time variation for up to $h_1 \cdots h_N = 10$.
- This paper adapts Stock and Watson (1998):
  - Structural breaks in fraction of the indicator variables and moderate time-variation for remainder.
  - Also: breaks/time-variation in factor dynamics and idiosyncratic components.
  - Conclusions qualitatively similar to Stock and Watson (1998)

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Despite breaks/time-variation $\Rightarrow$ Principal components consistently estimate space spanned by common factors. Why?

- $N \to \infty$ faster than $T \to \infty$
- Breaks/time-variation cross-sectionally independent
- RESULT: 'Average out' instability across indicator series.

Empirical application: mid-1980s 'Great Moderation' only affects factor dynamics resulting in instable forecasting regressions.

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  Alternative: non-linear factor dynamics.

  Kim and Nelson (1998), Chauvet (1998): Diffusion index model with Markov switching factor dynamics.

  Shintani (2005): ANN factor dynamics.
- Check properties with Monte Carlo simulations $\Rightarrow$ Can we discern non-linearity from instability?

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- Page 2: "... if the instability is sufficiently independent across series ... the estimated factors could be well estimated even if individual relations between the observable series and the factors are unstable"
- Maybe heroic assumption?
- Panels for factor models mostly made up of sub-aggregates
  $\Rightarrow$ possibly common breaks
  $\Rightarrow$ possibly locally related breaks as in Qu and Perron (2007).

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  Example: trend inflation $\uparrow \Rightarrow$ expectations, commodities $\uparrow$
  $\Rightarrow$ other price components $\uparrow$.

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Common result: dynamic factor models are not great at forecasting inflation

$\Rightarrow$ due to low-frequency shifts in inflation process.

Groen, Kapetanios and Price (2007): low-frequency shifts are such that 'judgemental' inflation forecasts beat time series methods.

Faust and Wright (2007): real-time inflation forecasts from factor models inferior to BMA and Greenbook forecasts.

So poor performance factor models due to inflation mean instability?

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This paper suggests 'probably not' ... at least not only.

Dominant principal components factor models $\rightarrow$ real activity.

Successful inflation forecasts from data-rich forecasting methods based on a 'targeted indicator variable set':

- Often BMA $>$ dynamic factor models $\rightarrow$ 'natural' targeting.
- Bai and Ng (2006): use 'boosting' to select a subsample from overall panel to extract principal components.

Future research: time-variation + 'inflation targeted' data-rich approaches

- BMA + dynamic mixture modelling (Ravazzolo *et al.* (2006)).
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