Understanding the Sources of Macroeconomic Uncertainty By Barbara Rossi, Tatevik Sekhposyan, and Matthieu Soupre

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Objective

- Decompose the “uncertainty about future” calculated from the U.S. Survey of Professional Forecasters (SPF) by exploiting the statistical properties of forecast volatility
- Understand the dynamic behaviors and economic implications of these uncertainty components

Motivation

- **Growing body of uncertainty indices in empirical work:**
  Jurado, Ludvigson & Ng (2015) *VAR-based*; Baker, Bloom & Davis (2016) *news-based*; Gilchrist, Sim & Zakrajek (2017) *corporate*; Caldara and Iacoviello (2018) *geopolitical*; Bekaert, Engstrom & Xu (2019) *asset price-based*; etc.

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  Disagreement, second moments (physical) of real variables, Knightian uncertainty, ex-ante, ex-post, etc.

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- **Divergent uncertainty interpretations in theoretical works:**
  Disagreement, second moments (physical) of real variables, Knightian uncertainty, ex-ante, ex-post, etc.

- This paper provides a unified statistical framework to identify the sources of uncertainty

Main findings

- **Core object of interest: Forecast uncertainty about GDP growth**

$$u_{t+h|t}(r) = \frac{1}{N}\sum_{s=1}^{N} E_Q\left(x_{t+h}(r) - P_{s,t+h|t}(r)\right)^2 \quad ; \quad U_{t+h|t} = \int_{-\infty}^{+\infty} u_{t+h|t}(r)\, dr.$$

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- **The decomposition:**
  1) Disagreement among forecasters about their predictive distribution

$$\int \frac{1}{N}\sum_{s=1}^{N}\left(P_{t+h|t}(r) - P_{s,t+h|t}(r)\right)^2 dQ_{t+h}$$

(then integrate over the spectrum of *r*)

  2) Aggregate Uncertainty: Mean squared forecast error of the aggregate forecaster

$$\int \left(x_{t+h}(r) - P_{t+h|t}(r)\right)^2 dQ_{t+h}$$

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  OR

  2.1) Ex-ante Uncertainty: Not influenced by realizations in data
  2.2) Ex-post Uncertainty: Influenced by realizations in data

Main findings

- **Dynamics:**
  - $\Rightarrow$ Disagreement: only a small portion of the overall uncertainty; show delays
  - $\Rightarrow$ Realized risk and Knightian uncertainty: equally important to aggregate uncertainty
- **Uncertainty resolving patterns:**
  - $\Rightarrow$ Disagreement $\downarrow$ as forecast horizons $\downarrow$
  - $\Rightarrow$ Aggregate uncertainty $\uparrow$ as forecast horizons $\downarrow$
- **Macroeconomic impacts (VAR with employment, fed fund rate, S&P500):**
  - $\Rightarrow$ Which one of their components leads to the largest business cycles fluctuations? Aggregate uncertainty

Comment #1: What I Like About the Paper

1. Economic question is important and relevant
2. Statistical part is novel and interesting
3. The model is highly tractable

Comments:

#2 The “first-world” problem

#3 Links to financial variables

#4 Writing and some “gotcha”s

Comment #2: The “first-world” problem

- **This paper has a very interesting but quite ambitious outline:**
  (a) decompose and identify uncertainty sources that are statistically feasible
  (b) understand how these separate sources evolve and resolve over time
  (c) transmissions and impacts of these separate sources

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  $\Rightarrow$ Part (a): How sensitive are the results to the choice of underlying macro variables in survey?
  Suggestion: It seems to be quite sensitive; the irrelevant disagreement result is rejected if we use inflation forecasts (see Section 7 of the paper). Does extant theories suggest this disconnect? Does the paper rationalize or explain the differences? (The inflation results look misplaced in the current draft.)

Comment #2: The "first-world" problem (Cont'd)

⇒ Part (b): Needs to be linked to the literature here → Helps increase confidence of the components

1. Suggestion: This is where the paper can run more tests to connect to existing uncertainty indices (JLN, BBD, BEX etc.). For example:
   (1) correlation of the overlapping sample,

Correlation	sJLN2015 (VAR-based)	sBBD2016 (news-based)	sBEX2019 (asset price-based)
sRSS-UNC	0.7671	0.1998	0.5963
sRSS-aggUNC	0.7672	0.1927	0.5964
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   (2) predictive regressions [of cumulative asset returns → informative about risk premium?] [of growth rate → improve Bloom (2009)?]

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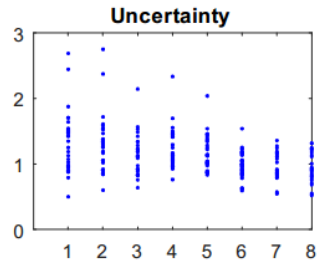
2. Suggestion: Can we run statistical tests to formally examine the pattern (as the paper claimed, i.e., decreasing for uncertainty) instead of simply eyeballing?



Comment #2: The “first-world” problem (Cont’d)

⇒ Part (c): The current VAR structure enters 1 uncertainty component at a time.
Suggestion: If the goal is to identify different macroeconomic impacts and transmissions of various sources of uncertainty that you identify, this naturally requires a VAR structure with multiple uncertainty variables in one system (e.g. a horse race).

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1. Suppose:

$$\boldsymbol{A}\boldsymbol{Z}_t = \phi \boldsymbol{Z}_{t-1} + \varepsilon_t,$$

where allow 0s among uncertainty exposures to each other, but allow output growth (or other Zs) to have different exposures to various sources of uncertainty

2. Imagine a decomposition analysis of the total variability of key macro variable of interest = % disagreement + % physical risk + % Knightian

Comment #3: Links to financial variables

- **Recent literature: macroeconomic uncertainty versus financial uncertainty**
  - $\Rightarrow$ Typical finding: it is the stock market/financial uncertainty that exhibits strong predictive power of output growth
  - $\Rightarrow$ Evidence: Bloom (2009), Gilchrist, Sim & Zakrajek (2017), Bekaert, Engstrom & Xu (2019), Ludvigson, Ma & Ng (2019), etc.

Suggestion: It would be helpful to cross-check to what extent your macroeconomic sources comove with financial uncertainty

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- **Why this is a useful exercise?**
  1. Provide a macro-cleansed financial uncertainty, and examine whether it improves output growth predictability
  2. Provide testable hypothesis for asset pricing theories (e.g., should we care about disagreement in modeling heterogeneous agent models?)
  3. ...

Other Suggestions

1. Realized risk → physical risk (to avoid ambiguity with the concept of realized vol in the finance literature; e.g., daily realized variance at $t = \sum_{\tau \in t} r_\tau^2$)

2. Typos in Equation (10); e.g., lower case and upper case p

3. Organize terms in Equation (10) to be consistent with the order in Equation (11)

4. Section 3.3 Ex-ante and ex-post uncertainties need more economic and intuitive discussions on how to interpret these statistical terms; e.g., one might think "forecast uncertainty" is already ex-ante

5. Page 13: "The realized risk component was high during the latest financial crisis, and sharply decreased as soon as the recession was over; Knightian uncertainty (measured by Bt+hjt + Dt+hjt in Panel B, and its largest component, the mean bias Bt+hjt, depicted in panel C) remained persistently high even after the end of the crisis." Figure 3 shows the opposite pattern — need to double check this interpretation

6. Page 22: "Tables and Figures" — But there is no table.

7. The writing needs to be open about the disadvantages of the decomposition → e.g, low frequency

Conclusion

- I highly recommend it!
- To make it more convincing:
  1. Improve the consistency between the research questions and the actual delivery (might consider focusing on one decomposition)
  2. Improve the link to the literature

Thank You!

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