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Sentimental Recovery

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EFA Meeting 2020

RESULTS AND QUESTIONS

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Questions

- Is the upper bound informative about the true belief dispersion?
- Are there more economic restrictions that can be imposed?

Find belief P that has as much mass as possible concentrated in set A

$$\left\{P^A, Q^A\right\} \doteq \arg\max_{P,Q} \int \mathbf{1}\{s \in A\}\, dP(s)$$

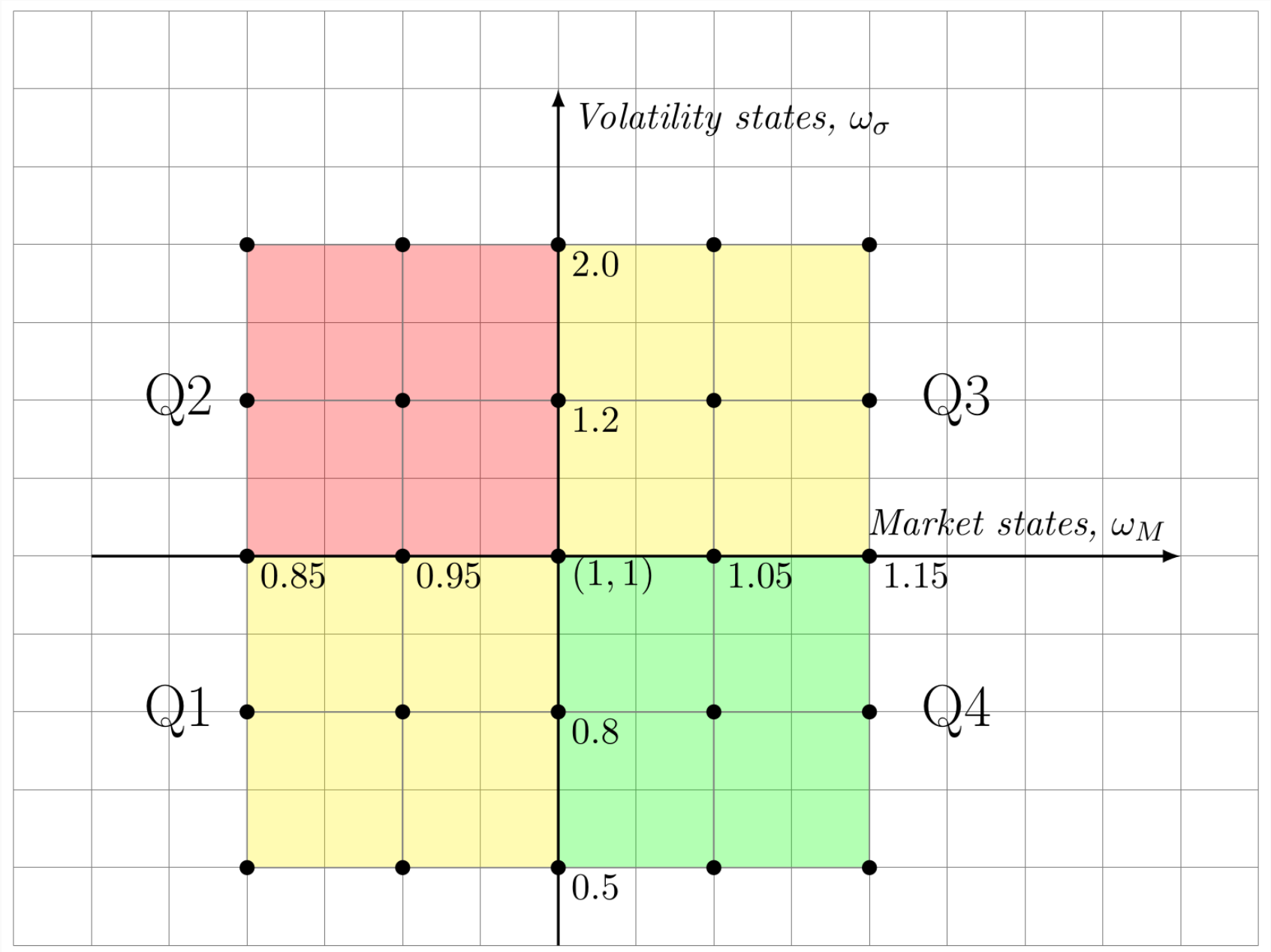
subject to

$$\begin{aligned} y_i &= \int x_i(s)\, dQ(s), \quad y_i \in [b_i, a_i] && \text{valuation within bid-ask spreads} \\ \alpha &\geq \int \left(\frac{dQ}{dP}(s)\right)^2 dP(s) && \text{good-deal bounds} \\ Skew^P &\geq Skew^Q && \text{RN distribution more skewed} \end{aligned}$$

Solve this problem for a variety of sets A and establish dispersion of P^As.

- use a rich set prices of derivatives on S&P500 and VIX, date by date

CHOOSING SETS A



RESULTS

1. Substantial and time-varying upper bound on the dispersion of beliefs.
   - a large set of beliefs consistent with asset price data
2. Set of market-compatible beliefs shrinks dramatically (by a factor of 100) once we assume a unique Q measure.
   - market incompletness and illiquidity play a crucial role in empirical recovery of investors' beliefs (P measure)
   - supports fragility of model-free 'recovery' results
3. Nevertheless, belief dispersion bound associated with measures indicative of true belief heterogeneity
   - volume and open interest

COMMENT # 1: BELIEF DISPERSION MEASURE AND SURVEY DATA

Perhaps we can compare the dispersion measure to other measures of belief dispersion.

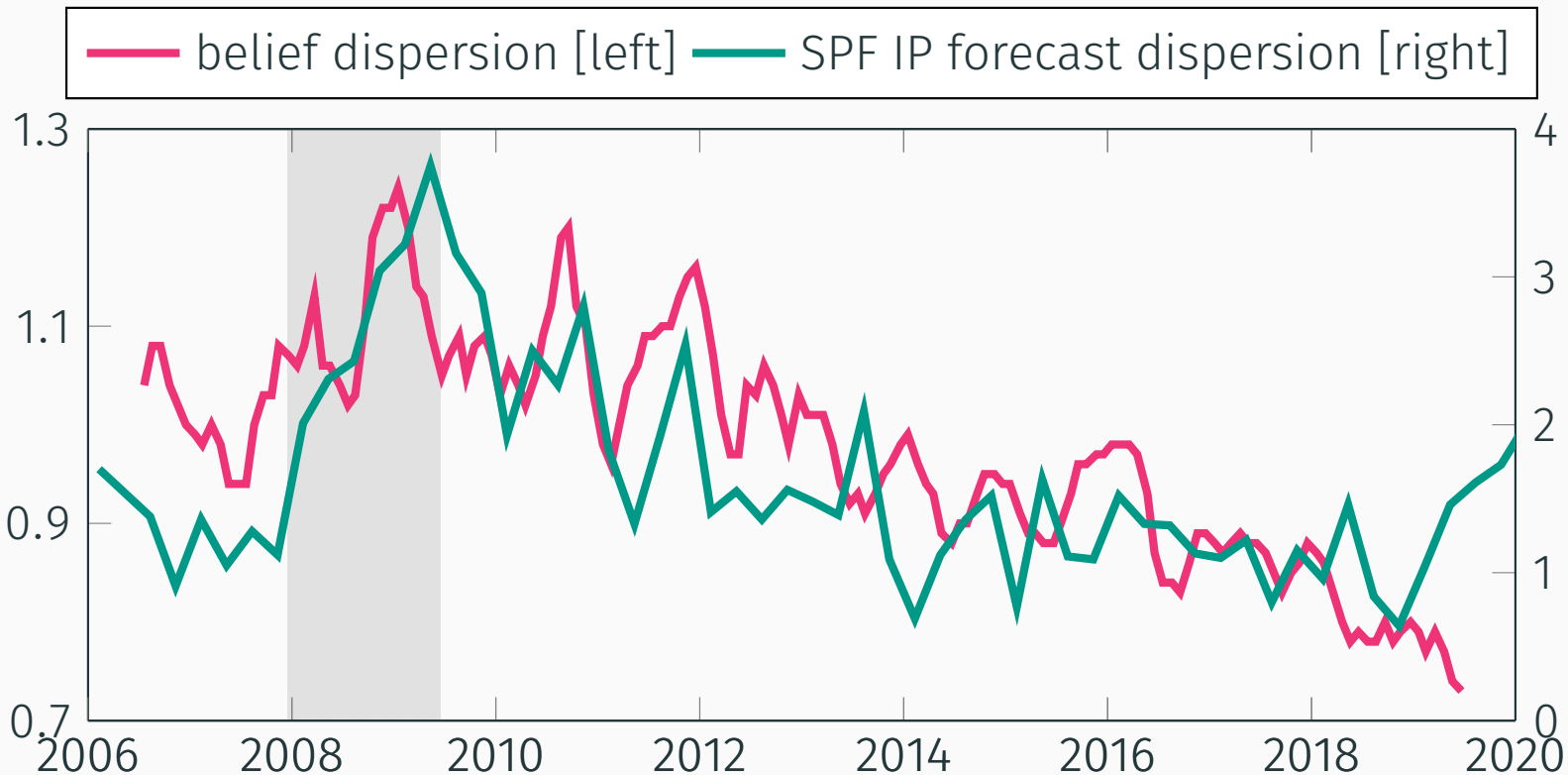
- Here: Survey of Professional Forecasters forecast dispersion
- look at measures of real activity and bond spreads
- even if correlation is high, quantitative assessment (translating magnitudes) is hard

More suitable: Look more directly at datasets of investor return forecasts

- Robert Shiller, Stefan Nagel, etc.

COMMENT # 1: BELIEF DISPERSION MEASURE AND SURVEY DATA

4Q ahead Industrial Production forecast seems to correlate quite strongly.



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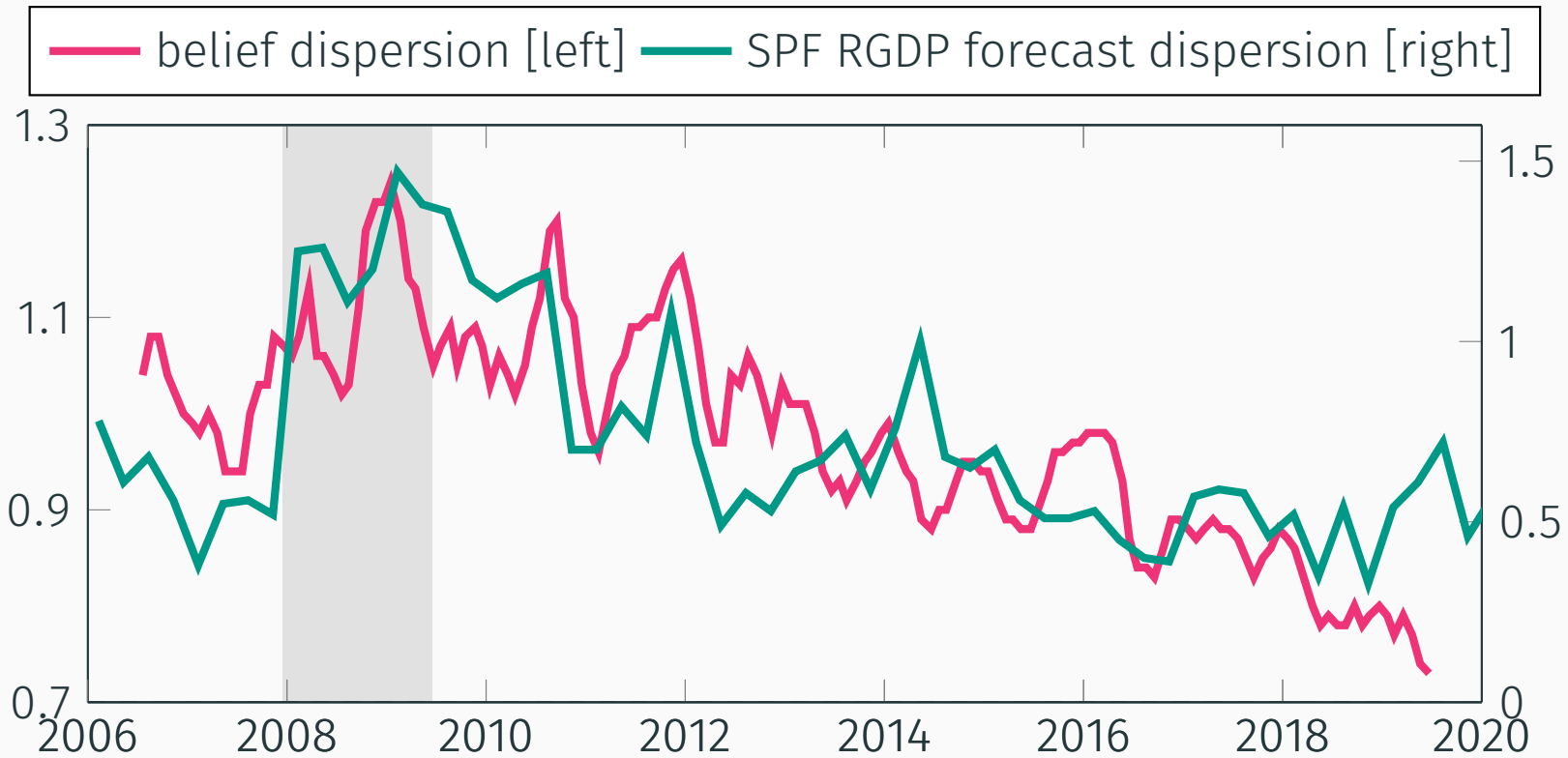
4Q ahead real GDP forecast too.



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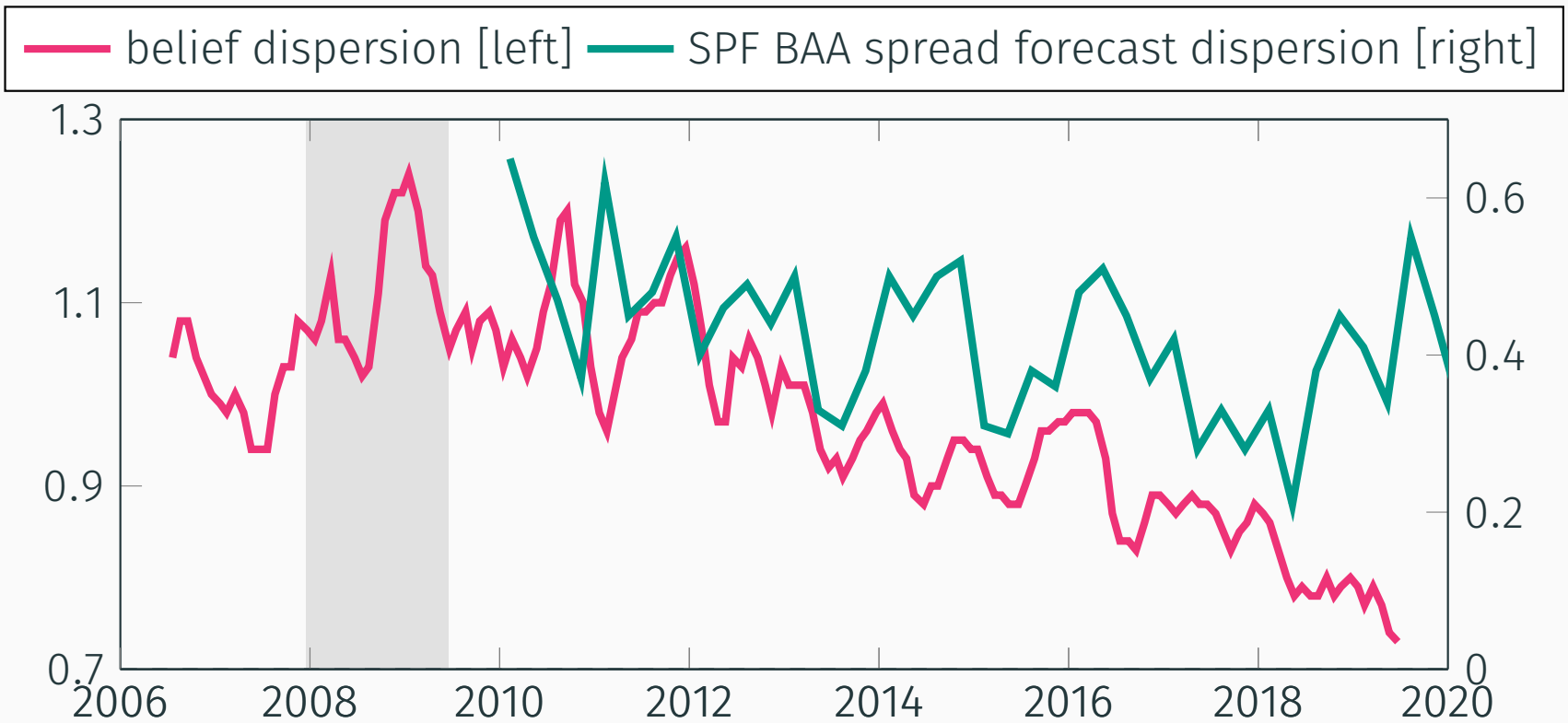
4Q ahead BAA–10-year Treasury bond yield spread not so much.



COMMENT # 2: TIGHTER RESTRICTIONS LINKING S&P500 AND VIX

Results yield minimal dispersion of σ^P and σ^Q for the S&P500 returns, yet very large dispersion in μ^P in VIX returns.

Grouping	$\mu^{\mathbb{P}}$	$\sigma^{\mathbb{P}}$	$Skew^{\mathbb{P}}$	$\rho^{\mathbb{P}}$	$\mu^{\mathbb{Q}}$	$\sigma^{\mathbb{Q}}$	$Skew^{\mathbb{Q}}$	$\rho^{\mathbb{Q}}$
Panel A: S&P 500 Moments with Independent Sorting								
10%	-0.042	0.176	-3.395	-0.355	-0.000	0.182	-3.601	-0.339
25%	-0.024	0.177	-3.218	-0.281	-0.000	0.182	-3.433	-0.275
Median	0.002	0.181	-3.102	-0.177	-0.000	0.183	-3.327	-0.182
75%	0.025	0.185	-3.032	-0.026	-0.000	0.183	-3.269	-0.036
90%	0.033	0.188	-2.980	0.123	0.000	0.184	-3.222	0.099
Panel B: VIX Moments with Independent Sorting								
10%	-0.175	1.074	-172.448	-0.355	-0.000	1.103	-185.355	-0.339
25%	-0.125	1.087	-158.717	-0.281	0.000	1.115	-170.550	-0.275
Median	-0.017	1.104	-127.169	-0.177	0.000	1.125	-136.429	-0.182
75%	0.087	1.121	-55.131	-0.026	0.000	1.134	-61.500	-0.036
90%	0.231	1.152	35.360	0.123	0.000	1.142	39.720	0.099

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Explicitly linking expected returns on VIX to σ^P and σ^Q of the S&P500 returns would increase efficiency.

- Would it be computationally unmanageable?

MORE SPECIFIC COMMENTS

1. More detail on the counterfactuals
   - What if we keep the securities but zero out bid-ask spreads?
   - How much does it matter that we do not have derivatives on the joint S&P500–VIX states?
2. Can you plot the shapes of P^A as examples (e.g., in the appendix)?
3. Regression results qualitatively suggestive.
   - How should we proceed to establish quantitative importance?

CONCLUSION

- A transparent, well executed idea.
- Authors are very clear regarding interpretation of their results.
- A warning sign for non-parametric empirical work that takes the set of traded derivatives as approximating a complete market.