Discussion of "Behavioral Impulse Responses"

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Overview

- This paper proposes the concept of Behavioral Impulse Responses (BIR) to measure deviations from Full Information Rational Expectations (FIRE)

- **Basic Idea:** Use survey data on consecutive forecasts of the same date t series to understand how forecast errors evolve in response to forecast revisions

- Very much like a dynamic Coibion-Gorodnichenko (2015) regression

Defining Concepts

- Let $F_t^{(n)}$ denote the n-period forecast of y_{t+n} made at time t
- Define $e_t^{(n)} = y_{t+n} - F_t^{(n)}$ denote the forecast error
- Let $R_t^{(n)} = F_t^{(n)} - F_{t-1}^{(n+1)}$ denote the forecast revision between time $t-1$ and t
- BIR defined as

$$B(n,j) = E\left[e_{t+j}^{(n-j)} | R_t^{(n)} = 1\right] - E\left[e_{t+j}^{(n-j)} | R_t^{(n)} = 0\right]$$

- $B(n,0)$ for different n is analogous to Coibion-Gorodnichenko regression coefficient

Comment 1: Long-Run Information

- When using SPF data, the paper focuses on short-run forecasts, out to three quarters ahead
- The SPF has longer-run, fixed-event forecasts: 1, 2, and 3 year forward, and 5 and 10-year average forecasts for certain variables
- Not as clean as short-run forecasts because they are forecasts of variables over periods longer than a quarter
- Nonetheless, these forecasts can shed light on how long-run expectations adjust and thus help further distinguish among theories of expectation formation

Comment 1: Long-Run Information

- **Example**: long-run inflation expectations
- Starting in 1991Q4 the SPF began collecting data on 10-year average CPI inflation expectations
- Forecasts are fixed-event for surveys within the same calendar year, i.e. for each quarter in 1995, you are asked “what do you think average inflation will be between 1994Q4 through 2013Q4"?
- Thus forecast revisions for this object can be constructed in Q2-Q4 each year, providing three points along the longest horizon BIR curve
- Even more horizons can be estimated when stringing together forward annual inflation forecasts

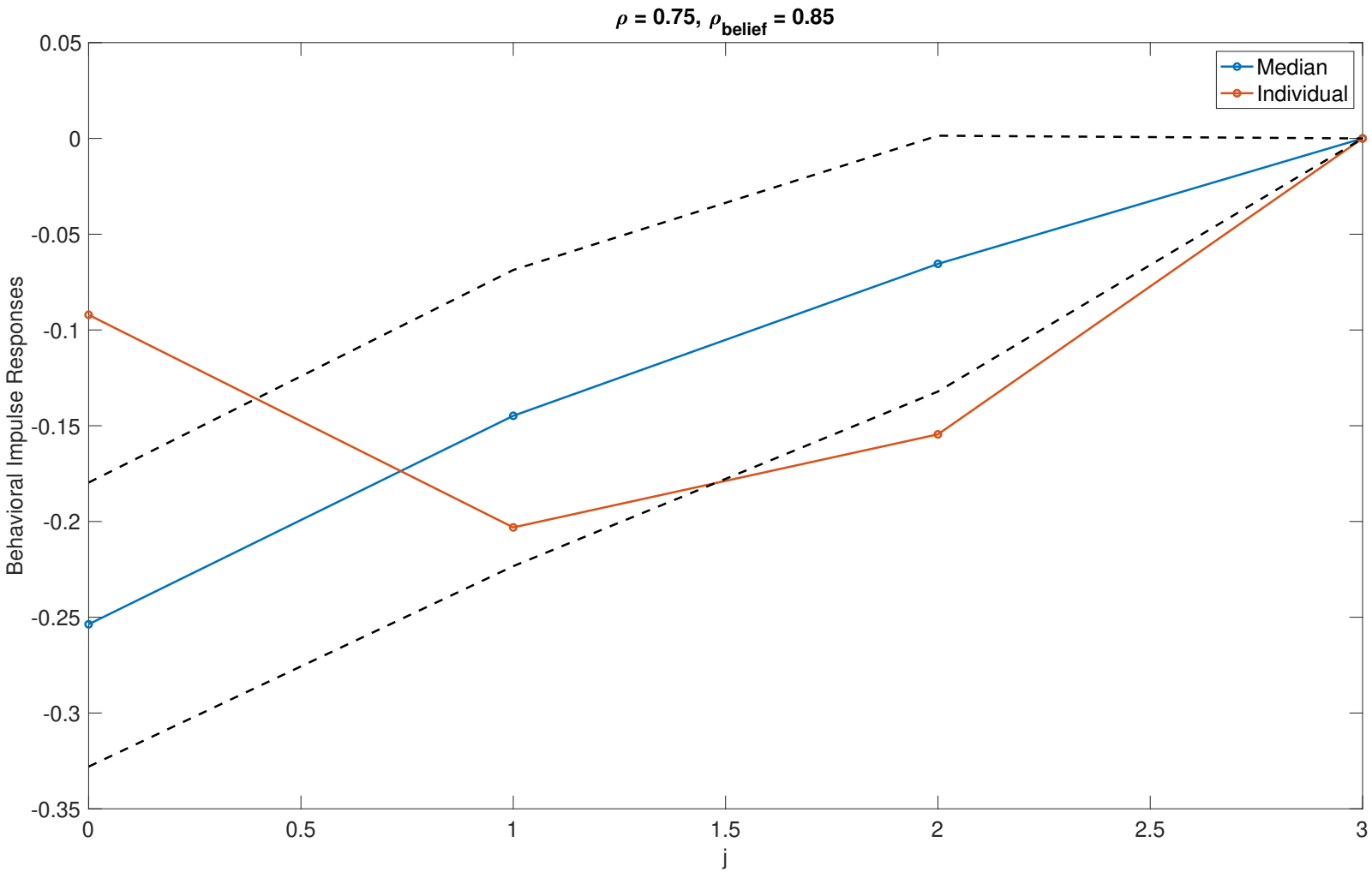
Comment 2: Local Projection Regularization

- A point of emphasis is the shape of the impulse response functions, i.e. are they concave or convex?
- Local projections are prone to a lot of jaggedness - high variance estimators
- Is convexity a genuine feature of the data or is this a result of estimation error / uncertainty?
- **Practical suggestion**: Use a regularization procedure such as Barnichon and Brownlees (2019) - willing to accept some bias to reduce the variance of the estimates

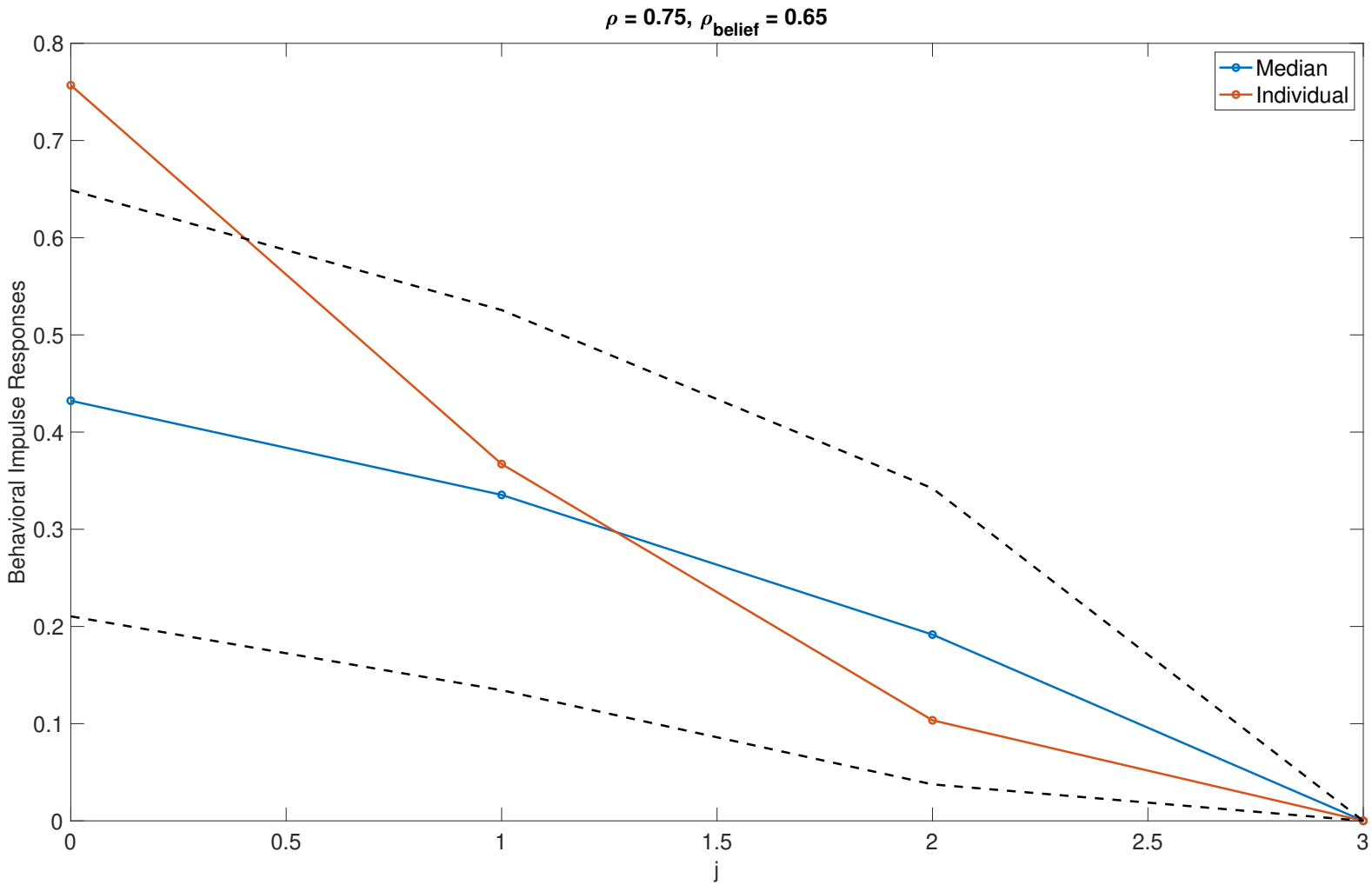
Why Does This Matter? - Sampling Uncertainty

- Consider a simple simulation experiment
- Assume the agent perfectly observes the series they are forecasting each period, y_t
- Simulate $N = 10,000$ samples of size $T = 260$ from a mean zero AR(1) process with persistence $\rho = 0.75$ and conditional volatility $\sigma = 2.17$ (chosen to roughly match annualized CPI inflation)
- For each simulated sample, construct forecasts according to a biased beliefs model, i.e. the agent mistakenly believes that the persistence is ρ_{belief} instead of ρ, $F_t^{(n)} = \rho_{belief}^n y_t$
- Estimate the distribution of $BIR(3, j)$ for $j = 0, \ldots, 3$ across simulations

Overreaction



UNDERREACTION



Comment 3: Lean in to the Heterogeneity

- The authors provide an extensive discussion of heterogeneity in BIRs across series and forecasters - quite novel!
- In my opinion, the prevalence of individual overreaction has been overemphasized in the literature
- 27% of SPF respondents and 35% of IBES respondents exhibit initial underreaction, $B(n, 0) < 0$
- 20% of SPF series and 30% of IBES series exhibit initial underreaction, $B(n, 0) < 0$
- Many forecasters' estimated overreaction is not statistically significant
- Which theories can account for this heterogeneity across forecasters?

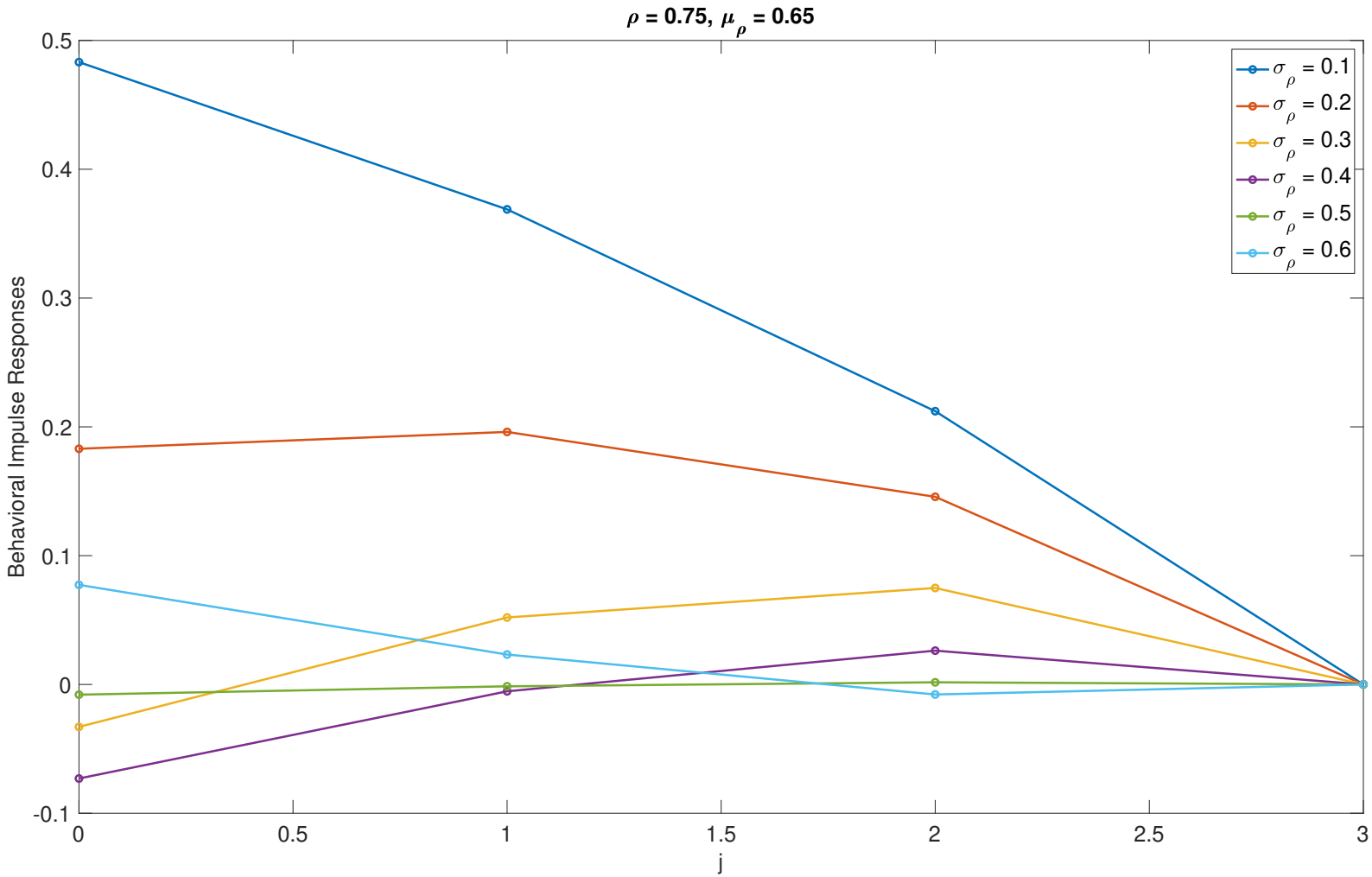
Comment 3: Experience Effect

- There is significant heterogeneity across experience levels
- Among forecasters who have been in the survey for at least a decade, they exhibit significantly less over(under)reaction after 5 years than in the their first 5 years
- Learning? Diminishing strength of behavioral biases? Both? Something else altogether?

Model Uncertainty is Flexible

- Consider another simulation experiment
- Assume the agent perfectly observes the series they are forecasting each period, y_t
- Simulate one long sample of size $T = 10,000,000$ from a mean zero AR(1) process with persistence $\rho = 0.75$ and conditional volatility $\sigma = 2.17$ (chosen to roughly match annualized CPI inflation)
- Construct forecasts according model with uncertainty about ρ, i.e. the agent has Normally distributed beliefs about ρ, $\rho \sim N(\mu_\rho, \sigma_\rho^2)$, so that $F_t^{(n)} = E\left[\rho^n\right] y_t$
- Estimate $BIR(3, j)$ for $j = 0, \ldots, 3$ across different levels of model uncertainty, σ_ρ

Why Does This Matter? - Population Moments



Conclusion

- This is a very interesting paper which uses well-established data to provide new moments, BIRs, for theories of expectation formation to match
- Documents significant heterogeneity in BIRs across many dimensions: forecasters, series, experience, etc
- Many directions for future research and extensions - most interesting in my opinion, how forecasts of different series react jointly