

The Future of Asset Pricing:  
Models of Beliefs  
NBER Asset Pricing Panel

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## Beliefs in asset pricing: Where do we stand?

- ▶ Beliefs central to asset pricing:  $\mathbb{E}_t[\cdot]$  in  $P = \mathbb{E}_t[M_{t+1}X_{t+1}]$
- ▶ Dominant paradigm still rational expectations (RE) = agents know model, parameter values, and forecast rationally
  - ▶ e.g., all empirical work w/ ass. that  $\frac{1}{T} \sum_{t=1}^T R_t \approx \mathbb{E}_{investors}[R_t]$
- ▶ Issues with RE models
  - ▶ Ascribes incredible amount of knowledge to agents even though learning may be slow, difficult (noisy data, many parameters, infrequent events, ...)
  - ▶ Conflicting empirical evidence from beliefs data: predictable forecast errors, belief heterogeneity, etc.
  - ▶ Epicycles in RE asset pricing (time-varying risk aversion, complicated endowment processes, ... ) ?
- ▶ Beliefs should be (more often) object of empirical and theoretical study, not simply model-implied as in RE

# Principles of a research program

- ▶ Focus on motivating, building, calibrating, estimating models with non-RE beliefs rather than merely rejecting RE
  - ▶ Structural approach
  - ▶ Focus on short-run dynamics rather than long-run convergence (to RE) questions
- ▶ Non-RE  $\neq$  irrational: Learning as first-stop alternative to RE
  - ▶ Bayesian learning and boundedly rational versions with approximate models, limited memory, attention
  - ▶ Seems more plausible than fixed biases, heuristics
- ▶ Discipline modeling with data on beliefs and micro decisions
  - ▶ Match beliefs data moments, rather than reverse-engineering beliefs dynamics from asset prices
  - ▶ Or, beliefs data directly as input, taking beliefs as given

## Open questions: Belief measurement

- ▶ Expectations of “fundamentals”: Cash flows, GDP, ...
  - ▶ Understudied in AP relative to return expectations
  - ▶ Prices can move due to  $\mathbb{E}[c.f.]$  w/o change in  $\mathbb{E}[R]$
- ▶ Term structures of expectations
  - ▶ Long-term expectations important for AP, but mostly unavailable in surveys
- ▶ Risk perceptions, especially tail risk
  - ▶ Some surveys elicit distributions, but difficult for respondents to understand and articulate
- ▶ Different types: Professional forecasters, professional investors, individuals, analysts
  - ▶ Focus on common components or map into heterogeneous beliefs models?
- ▶ Extend beliefs data: Back in time, to higher frequency?
  - ▶ Proxies: Textual? Machine learning? Social media?

## Open questions: Beliefs and actions

- ▶ To use beliefs data as model inputs or moments to match: need to separate decision-relevant signal from noise
  - ▶ Measurement error in beliefs data: may be different at various aggregation levels (e.g., cohorts, groups by investor characteristics, ...)
  - ▶ Beliefs mediated by confidence in stated beliefs, inattention to own beliefs, action thresholds?
  - ▶ Heterogeneity in belief–action correlation, e.g., by sophistication?
- ▶ On which dimensions do beliefs pass into actions through delegated portfolio management layer and on which dimensions are managers' beliefs relevant?
  - ▶ e.g., stock/bond allocation vs. style allocation vs. individual stock choice

## Open questions: Modeling belief formation

- ▶ Belief formation in high-dimensional environments
  - ▶ Learning predictive relationships with large numbers of predictors: Machine learning methods as model of belief formation?
- ▶ Memory of historical data: Personal, social/collective, institutional memory
- ▶ Belief formation when there is no history: new products, markets
  - ▶ Priors based on existing experience from other already existing markets, products?
  - ▶ Or diffuse priors and high sensitivity to short initial experience?

## Open questions: Beyond asset pricing

- ▶ Macro-finance: Revisit (absence of) links between asset price and macro quantity dynamics
  - ▶ Beliefs about returns from risky and safe technologies
  - ▶ Beliefs about tail risks
  - ▶ Belief heterogeneity
- ▶ Macro-finance: Do beliefs amplify effects of frictions ?
  - ▶ e.g., credit supply shocks and housing prices
- ▶ Wealth distribution and heterogeneous beliefs about asset returns
- ▶ Regulatory policy: Asset-price based regulation in non-RE setting
  - ▶ e.g., mark-to-market valuation, market-value triggers for contingent convertibles,