Subjective Beliefs, Disagreement, and Market Return Predictability

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Intro

- Rational expectations in asset pricing have important implications:
  - Volatile expected risk premia;
  - Smooth beliefs about dividend growth;
  - At odds with survey data on beliefs;
  - Related to other puzzles;
- Recent agenda: take more seriously subjective expectation data, reconsider puzzles;
- Predictability literature:
  - Under RE: predictable aggregate returns are due to time-varying risk premia;
  - Absent RE: mechanisms linking measurable beliefs to overpricing and future returns;
  - Recent evidence that subjective beliefs about dividends (and earnings) predict market returns (Bordalo et al., 2019; De La O and Myers, 2021; Bordalo et al., 2023);

Mechanisms - Not exhaustive

Disagreement:

- With heterogeneity, agents may disagree in equilibrium;
- Many reasons: different priors, different information sets/signals, different abilities to process info ...;
- Short-selling constraints prevent pessimists from trading and disciplining optimists;
- Prediction: $\uparrow$ disagreement $\implies$ $\uparrow$ prices (and $\downarrow$ future returns); (Miller, 1977; Atmaz and Basak, 2018)

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Belief overreaction:

- Agents update their beliefs based on current dividend growth news.
- They overreact and become excessively optimistic after good news.
- Prediction: $\uparrow$ beliefs about growth $\implies$ $\uparrow$ prices (and $\downarrow$ future returns); (La Porta, 1996; Bordalo et al., 2023)

This Paper

- We study whether disagreement and subjective beliefs can predict index returns;
- We evaluate these different mechanisms *both* in-sample and out-of-sample;
- We rely on survey data from equity analysts from large financial institutions;

Results are **negative**:

- Predictability through disagreement has disappeared over time;
- Predictability through earnings expectations is unstable across subsamples;
- Neither forces dominates;
- No extra predictive value added after we control for the price/earnings ratio;

Data and Definitions

Market data:

- Aggregate returns: value-weighted (total) index returns from CRSP;
- Price/earnings ratio (`PE`): CAPE measure from Robert Shiller's website;

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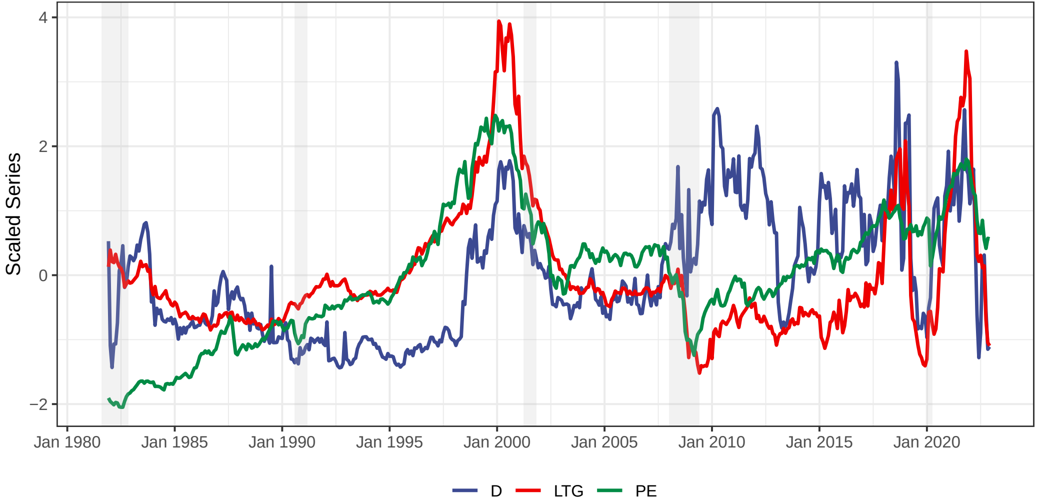
Subjective Beliefs: analyst survey from I/B/E/S

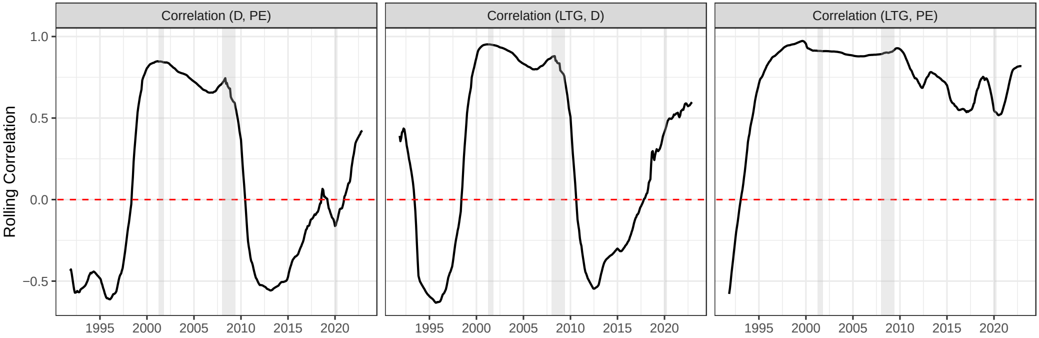
- Analysts provide forecasts for "long-term earnings growth" rates (`LTG`);
- *"...the expected annual increase in operating earnings over the company's next full business cycle. These forecasts refer to a period of between three to five years"*.
- Sample: December, 1981 - December, 2022 (monthly frequency);
- We consider the value-weighted first and second moments of beliefs:

$$w_{i,t} \equiv \frac{P_{i,t} \cdot Q_{i,t}}{\sum_{j=1}^{N_t} P_{j,t} \cdot Q_{j,t}} \qquad LTG_t \equiv \sum_{i=1}^{N_t} w_{i,t} \cdot LTG_{i,t} \qquad D_t \equiv \sum_{i=1}^{N_t} w_{i,t} \cdot D_{i,t}$$

Subjective Beliefs and PE Time Series



Rolling Correlations



- 10-year rolling windows;
- Correlation changes sign over time;

An In-Sample Predictability Test

We estimate the following predictive regression:

$$R_{t+h|t} = \alpha + \beta_{LTG} \cdot LTG_t + \beta_D \cdot D_t + \beta_{PE} \cdot PE_t + \epsilon_{t+h} \tag{1}$$

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- Theory $\implies \beta_{LTG} < 0, \beta_D < 0$;
- Today: $h = 36$. In the paper, we also do $h = 12$ and $h = 60$;
- Yu (2011) found $\beta_D < 0$, but his sample stopped in 2007;
- Bordalo et al. (2023) found $\beta_{LTG} < 0$, but do not consider D_t; Sample end: 2015;
- We revisit these samples and then study the 1981-2022 period;

Revisiting Yu (2011)

Same sample as Yu (2011) (1981-2007)						
	R_{36}					
	(1)	(2)	(3)	(4)	(5)	(6)
LTG	-0.65***		-0.33	-0.42		0.47**
	(-3.59)		(-1.27)	(-1.09)		(2.13)
D		-0.68***	-0.45		-0.51*	-0.72**
		(-3.30)	(-1.38)		(-1.88)	(-2.22)
PE				-0.28	-0.41**	-0.72***
				(-0.73)	(-2.14)	(-4.83)
N	253	253	253	253	253	253
R^2	0.378	0.416	0.460	0.396	0.538	0.562

- Coefficient on `LTG` changes sign;
- Coefficient on `D` seems stable;
- Similar results to $h = 12$ and $h = 36$ (see the paper!)

Revisiting Bordalo et al. (2023)

Same sample as Bordalo et al. (2023) (1981-2015)						
	R_{36}					
	(1)	(2)	(3)	(4)	(5)	(6)
LTG	-0.47***		-0.41***	-0.02		-0.01
	(-3.19)		(-3.47)	(-0.09)		(-0.04)
D		-0.36	-0.28		-0.22	-0.22
		(-1.03)	(-1.21)		(-0.74)	(-0.74)
PE				-0.59**	-0.55***	-0.54*
				(-2.10)	(-3.00)	(-1.70)
N	373	373	373	373	373	373
R^2	0.198	0.120	0.265	0.339	0.382	0.380

- Effect of `D` disappeared;
- Effect of `LTG` disappears if we control for `PE`;
- Similar results to $h = 12$ and $h = 60$;

Full-Sample

	Full-Sample (1981-2022)					
	R_{36}					
	(1)	(2)	(3)	(4)	(5)	(6)
LTG	-0.37		-0.33	-0.01		-0.01
	(-1.56)		(-1.49)	(-0.03)		(-0.03)
D		-0.27	-0.20		-0.10	-0.10
		(-1.16)	(-0.91)		(-0.42)	(-0.42)
PE				-0.55***	-0.52**	-0.52***
				(-3.85)	(-2.29)	(-2.87)
N	457	457	457	457	457	457
R^2	0.129	0.068	0.163	0.288	0.298	0.296

- Only significant predictor is PE;
- As soon as we add PE, all other coefficients shrink towards zero;
- No evidence of predictability through subjective beliefs;
- Similar results to $h = 12$ and $h = 60$;

Out-of-sample Forecasting

- Can these variables predict return out-of-sample? What if we use them jointly?
- *When* are each of these models getting it right/wrong?

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- What's our benchmark? The historical average;
- We evaluate forecasts using the OOS R^2 from Campbell and Thompson (2008):

$$R^2_{OOS}(t_0, h) = 1 - \frac{\sum_{t=t_0}^{T} \left(R_{t|t-h} - \widehat{R}_{t|t-h} \right)^2}{\sum_{t=t_0}^{T} \left(R_{t|t-h} - \overline{R_{t|t-h}} \right)^2} \tag{2}$$

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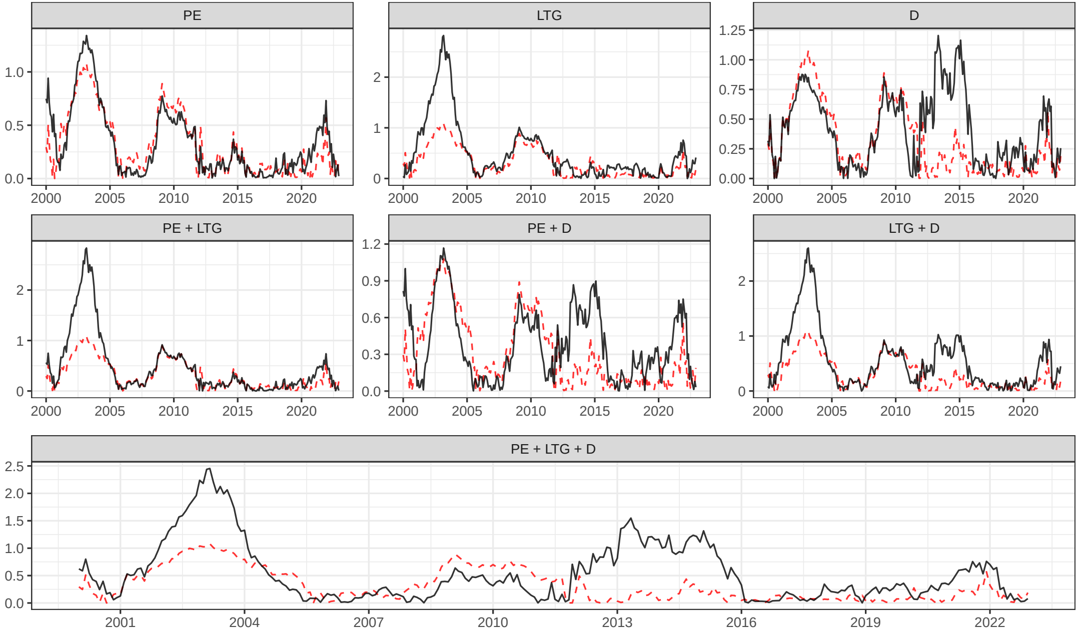
- What t_0 should we use? We pick July, 2007 but we make it vary in the paper;
- It ensures analysts had knowledge of the dot-com bubble burst;

R^2_{OOS} – A snapshot of performance

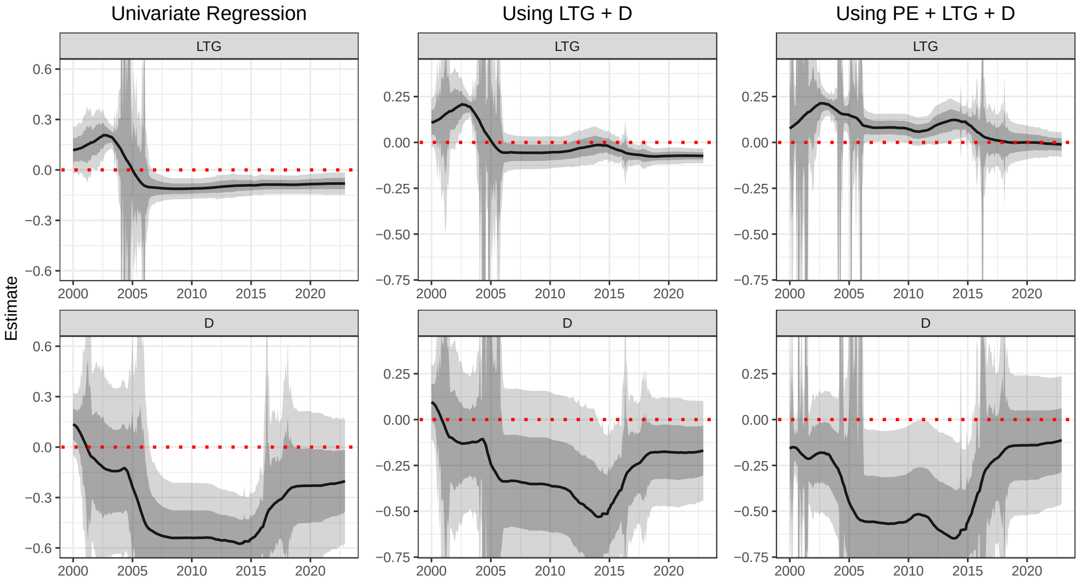
Forecast Horizon h (in months)	6	12	36	60
PE	0.04	0.08	0.12	0.36
LTG	0.01	0.04	-0.51	-0.22
D	-0.09	-0.32	-1.51	-0.92
PE + LTG	0.03	0.06	-0.17	0.21
PE + D	-0.06	-0.19	-0.77	0.08
LTG + D	-0.09	-0.28	-1.35	-0.38
PE + LTG + D	-0.13	-0.48	-2.18	-1.98

- After we control for PE, no added value from subjective beliefs;
- More complex models suffer: bias vs variance trade-off;

Absolute Forecast Error



Coefficients Over Time



Wrap-Up

Background:

- Mechanisms of overpricing leading to return predictability (theory); mean growth expectations (`LTG`) and disagreement (`D`).
- Channels have been evaluated in isolation, in particular samples.

Our conclusions:

- In sample: evidence of predictability is fragile across samples and specifications.
- Out of sample: poor performance, dominated by standard PE measure.

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Thank you!

Appendix

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