Expectations about stock returns

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PhD Course on Subjective Beliefs, Attention and Economic Behavior

Subjective expectations about stock returns

- According to standard models in finance, the **expected return** on an asset is a key determinant of how much to invest in this asset.
- Households may not know the true expected return on an asset, so they have to rely on their **subjective beliefs**.
- This lecture: Focus on **subjective expectations about stock returns** and their role in households' decisions about how much to invest in stocks.
- Focus mostly on the **aggregate stock market**, but many of the themes coverde in this lecture extend to beliefs about the returns of individual stocks or of other assets.

Goals of this lecture

- Get to know the **measurement** of households' stock return expectations as well as their **properties** and implications of these.
- Understand how beliefs could explain **non-participation** in the stock market.
- Understand the link between return expectations and the **portfolio share** invested in stocks.
- See how **economic theory** can help us interpret data.
- Get to know **recurring problems** in empirical work on subjective beliefs and ways to address them.

Outline of lecture

1. Measurement of stock return expectations
2. Properties of households' stock return expectations
3. Stock return expectations and stock market participation
4. Stock return expectations and the risky portfolio share: Correlational evidence
5. Stock return expectations and investment behavior: Experimental evidence

Surveys

- To measure people's beliefs, we need to conduct **surveys**.
- Important considerations:
  - Is the wording **understandable** to laypeople?
  - Does the question capture the object of interest according to **theoretical models**?
  - Do we survey a **relevant sample** of respondents?
  - Can we link the survey data to **administrative data** on investment decisions?

Eliciting stock return expectations: Point forecasts

radius
GLOBAL MARKET RESEARCH

What do you expect the return of the US stock market to be **over the next 12 months**?

Note: This expected return is the change in value, in percent, that you expect to receive **over the next 12 months** from investing in a portfolio that holds all stocks listed on the US stock market. It includes both dividends and capital gains/losses.

(Please answer only with a positive or negative numeric value, with at most 1 decimal.)

[ ] % over the next 12 months

Next

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Survey question on aggregate stock return expectations used in Giglio et al. (2021).

Eliciting stock return expectations: Subjective probability distributions

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In this question we present you with five possible scenarios for US stock market returns **over the next 12 months**:

The US stock market return will be...

- Scenario 1: **more than 40%** over the next year.
- Scenario 2: **between 30% and 40%** over the next year.
- Scenario 3: **between -10% and 30%** over the next year.
- Scenario 4: **between -30% and -10%** over the next year.
- Scenario 5: **less than -30%** over the next year.

Please let us know how likely you think it is that each scenario will occur.

Please type in the number to indicate the probability, in percent, that you attach to each scenario. The probabilities of the five scenarios have to sum up to 100%. The graphic bar chart on the right updates automatically to reflect your answers.

(Please answer only with a positive numeric value, with at most 1 decimal.)

more than 40%	2.5 %	2.5%
between 30% and 40%	20 %	20%
between -10% and 30%	55 %	55%
between -30% and -10%	15 %	15%
less than -30%	7.5 %	7.5%
Total	100.0%	

Remaining probability to fill in: 0.0%

Next

Survey question on aggregate stock return expectations used in Giglio et al. (2021).

Point forecasts vs subjective probability distributions

- Point forecasts require **less effort** from survey respondents and use up less survey time ...
- ...but it is unclear **which moment** of people's subjective distribution they capture (mean, median, mode, ...).
- Subjective probability distributions allow to construct measures of both the **mean** and the **uncertainty** around people's expectations.

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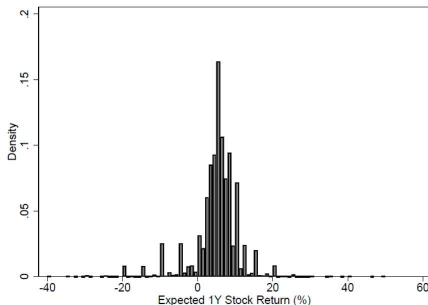
Property 1: Return expectations are heterogeneous

- Substantial **disagreement** in return expectations across households (Adam and Nagel, 2022; Malmendier and Nagel, 2011).
- About half of this disagreement reflects **persistent differences** across individuals (Giglio et al., 2021).



Aggregate stock return expectations among Vanguard clients (Giglio et al., 2021).

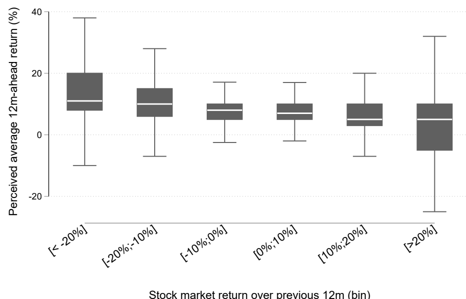
Property 1: Return expectations are heterogeneous

Implications:

- Disagreement could explain **heterogeneity in portfolio shares**.
- Disagreement about expected returns is potentially an important driver of **trade** in asset markets.
- Standard representative agent asset pricing models do not feature disagreement.
- **Heterogeneous agent models** featuring disagreement perform well in explaining stylized facts about asset prices (Barberis et al. (1998), Dumas et al. (2009), Banerjee and Kremer (2010), Barberis et al. (2015), ...).
- Potential **origins** of disagreement: private information, public information + overconfidence, different forecasting rules (e.g., due to different subjective models), different experiences, ...

Property 2: Return expectations are influenced by recent return realizations

- Investors on average seem to **extrapolate** recent return realizations (Greenwood and Shleifer, 2014; Malmendier and Nagel, 2011; Vissing-Jorgensen, 2003).
- Recent evidence of pronounced **heterogeneity** in the perceived autocorrelation of returns (Laudenbach et al., 2022; Nagel and Xu, 2022).



Notes: Beliefs about the historical autocorrelation of returns among German retail investors (Laudenbach et al., 2022).

Property 2: Return expectations are influenced by recent return realizations

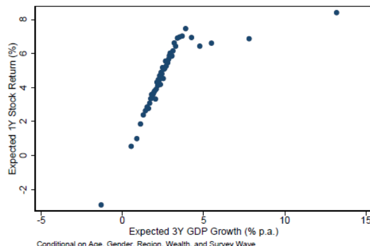
Implications:

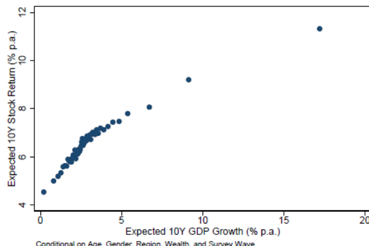
- Empirically, autocorrelation of returns close to zero, at least for the aggregate stock market (Nagel and Xu, 2022).
- Extrapolation of returns can lead to **investment mistakes** and may have implications for **equilibrium prices**.
- Heterogeneity in perceived autocorrelation implies different **forecasting rules**, supporting models such as Barberis et al. (2015).
- See Barberis (2018) for a discussion of potential **origins** of extrapolation or beliefs in mean reversion: representativeness heuristic, law of small numbers, mis-specified mental models, memory and experiences, …

Property 3: Return expectations are pro-cyclical

- Return expectations tend to be highest during economic **booms**, contrary to theory and actual returns (Amromin and Sharpe, 2014).
- Return expectations are **positively correlated** with expected GDP growth, within and across individuals (Giglio et al., 2021).

Expectations about Stocks vs. GDP





Notes: Return and GDP growth expectations among Vanguard clients (Giglio et al., 2021).

Property 3: Return expectations are pro-cyclical

Implications:

- In finance language: expected return = discount rate; expected GDP growth ≈ expected cash flow growth / dividend growth.
- Campbell and Shiller (1988) decomposition:

$$pd_t \approx E_{i,t} \sum_{j=0}^{\infty} \rho^j \Delta d_{t+1+j} - E_{i,t} \sum_{j=0}^{\infty} \rho^j r_{t+1+j} \tag{1}$$

- Time series: variation in expected future dividend growth can be offset by variation in discount rates.
- Calibrations matching only one side **overstate** the importance of beliefs.

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Limited stock market participation

- One important empirical finding in the household finance literature is wide-spread **non-participation** in the stock market (Haliassos and Bertaut, 1995).
- Participation rate lower than 50 percent in most countries (Gomes et al., 2021).
- Pessimistic beliefs about stock returns may explain why some households do not own stocks.

Pessimism in stock return expectations

- Dominitz and Manski (2007) find about two-thirds of respondents to the US Health and Retirement Survey reporting **no more than a 50-50 chance** of earning a positive nominal return holding stocks:

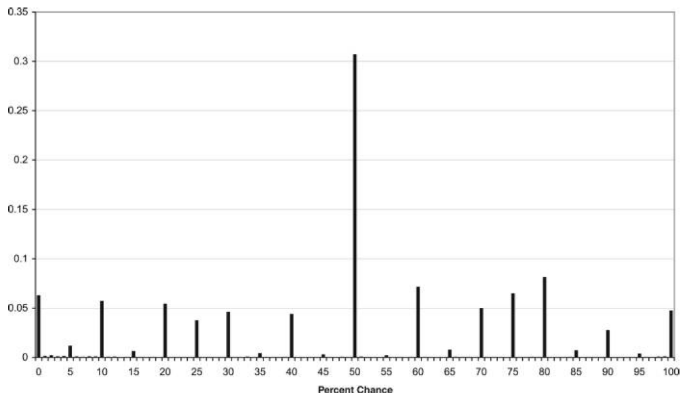

FIGURE 1. Percent chance of a positive nominal return, frequency distribution.

Can pessimistic beliefs explain non-participation?

- Several studies document that the likelihood of holding stocks increases in people's return expectations (Arrondel et al., 2022; Dominitz and Manski, 2007; Drerup et al., 2017).

TABLE 2. Probability of holding stocks or stock mutual funds conditional on percent chance of positive nominal return, gender, and marital status.

Percent chance of positive nominal return	Married or living with a partner: Male, Point estimate	Married or living with a partner: Male, Standard error	Married or living with a partner: Female, Point estimate	Married or living with a partner: Female, Standard error	NOT married or living with a partner: Male, Point estimate	NOT married or living with a partner: Male, Standard error	NOT married or living with a partner: Female, Point estimate	NOT married or living with a partner: Female, Standard error
0	0.16	(0.02)	0.25	(0.03)	0.08	(0.03)	0.08	(0.02)
1–10	0.27	(0.03)	0.31	(0.02)	0.16	(0.04)	0.20	(0.02)
11–20	0.30	(0.03)	0.34	(0.03)	0.16	(0.05)	0.14	(0.03)
21–30	0.29	(0.03)	0.35	(0.02)	0.19	(0.05)	0.23	(0.03)
31–40	0.33	(0.04)	0.37	(0.03)	0.16	(0.05)	0.18	(0.03)
41–49	0.22	(0.14)	0.18	(0.12)	0.50	(0.25)	0.33	(0.14)
50	0.37	(0.01)	0.40	(0.01)	0.25	(0.02)	0.25	(0.02)
51–59	0.50	(0.14)	0.63	(0.17)	0.20	(0.18)	0.20	(0.18)
60–69	0.48	(0.03)	0.50	(0.03)	0.30	(0.06)	0.31	(0.03)
70–79	0.48	(0.02)	0.50	(0.02)	0.38	(0.04)	0.41	(0.03)
80–89	0.52	(0.02)	0.52	(0.03)	0.42	(0.05)	0.30	(0.04)
90–99	0.48	(0.03)	0.49	(0.05)	0.24	(0.07)	0.43	(0.07)
100	0.43	(0.03)	0.45	(0.04)	0.25	(0.05)	0.23	(0.04)
All	0.40	(0.01)	0.40	(0.01)	0.25	(0.01)	0.24	(0.01)

Correlation between perceived chance of positive return and participation in Dominitz and Manski (2007).

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Extensive vs intensive margin of stock investment

- We have seen that beliefs might matter for the decision of **whether to participate** in the stock market (the extensive margin).
- But how do beliefs affect the decision of **how much to invest** in stocks among people who already participate (the intensive margin)?
- The next few slides follow closely Giglio et al. (2021).

A simple model of portfolio choice

- Merton (1969) studies an investor with power utility allocating an investment between a **risk-free** and a **risky asset**.
- Optimal equity share given by:

$$\text{Equity share}_{i,t} = \frac{1}{\gamma_i} \frac{\mathbb{E}_i[R_t] - R_t^f}{\text{var}_i[R_t]}$$

where

- γ_i is investor i's coefficient of relative risk aversion.
- $\mathbb{E}_i[R_t]$ is investor i's subjective return expectations.
- $\text{var}_i[R_t]$ is investor i's perceived riskiness of stocks.
- R_t^f is the rate of return on the risk-free asset.

Predicted elasticity of the equity share to beliefs I

- Imagine we have a **cross-sectional dataset** of portfolios and subjective beliefs.

- Imagine we run a regression of the following type:

$$\text{Equity share}_{i,t} = \beta_0 + \beta_1 \mathbb{E}_i[R_t] + \beta_2 \mathbf{X}_{i,t} + \varepsilon_{i,t}$$

- What coefficient estimate β_1 should we expect to see according the Merton (1969) model?

Predicted elasticity of the equity share to beliefs II

- $\beta_1 = \frac{1}{\gamma_i \text{var}_i[R_t]}$
- Assumptions:
  - Common **perceived riskiness** of stocks corresponding to a standard deviation of returns of 20 pp per year (in line with historical standard deviation).
  - Common coefficient of relative **risk aversion** ranging between 3 and 10 (in line with experimental literature).
- β_1 should range **between 2.5 and 8.3**.

Estimates from Giglio et al. (2021)

- Giglio, Maggiori, Stroebel and Utkus (2021) match survey responses of wealthy Vanguard clients with **administrative data** on their retirement accounts.
- They regress the equity share in an investor's portfolio on his/her subjective return expectations.
- They obtain estimates of β **around 0.7**, substantially **below** the model predictions (2.5 to 8.3).
- Similar results obtained in other studies (Ameriks et al., 2020; Amromin and Sharpe, 2014; Kézdi and Willis, 2011; Vissing-Jorgensen, 2003).

Explanation I: The data are wrong!

- Why are portfolios so insensitive to beliefs?
- One explanation is **measurement error in subjective beliefs**.
- May bias coefficient estimates towards zero (attenuation bias).
- Giglio et al. (2021) address this using ORIV methods (Gillen et al., 2019):
  - Idea: Instrument one noisy measure with **another noisy measure**.
  - This fully accounts for measurement error if errors in the two variables are **uncorrelated**.
  - Here: **point forecast** and **mean of subjective probability distribution** as measures of subjective return expectation.
- Estimate of β_1 increases to **about 1.2**, but still far **below the theory predictions**.

Explanation II: The theory is wrong!

- The Merton (1969) model makes a range of **simplifying assumptions**:
  - No capital gains **taxes**.
  - Full **attention** to portfolios.
  - **Immediate** adjustments of portfolios to changes in beliefs.
  - Full **confidence** in beliefs.
- Giglio et al. (2021) repeat their estimations on a sample of **"idealized" investors** that face tax exemptions, that are attentive to their portfolio and that are confident in their beliefs.
- They find an elasticity of portfolios to beliefs of around $\beta_1 = 3.6$ in this sample, **within the range of theory predictions**.

Taking stock

- Portfolio choices are **less sensitive** to return expectations than predicted by theory.
- This partially reflects **measurement error** in subjective beliefs.
- But mostly this seems to be due to **frictions** such as inattention or lack of confidence.

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Potential issues with correlational evidence

- Omitted variables:
  - General optimism or pessimism.
  - Cognitive abilities.
  - Familiarity with the stock market.
  - ...
- Reverse causality:
  - If I hold more stocks, I may want to believe in a high expected return.
- We can overcome these problems by conducting **experiments** that generate **exogenous variation** in stock return expectations, e.g., through randomized provision of information.

Causal evidence from information provision experiments I

- Beutel and Weber (2022):
  - **General population** surveys in Germany.
  - Provide respondents randomly with different pieces of information (earnings forecasts, recent returns, ...) **shifting their return expectations**.
  - Changes in return expectations cause changes in **hypothetical** investment decisions of a similar magnitude as in Giglio et al. (2021).

Causal evidence from information provision experiments II

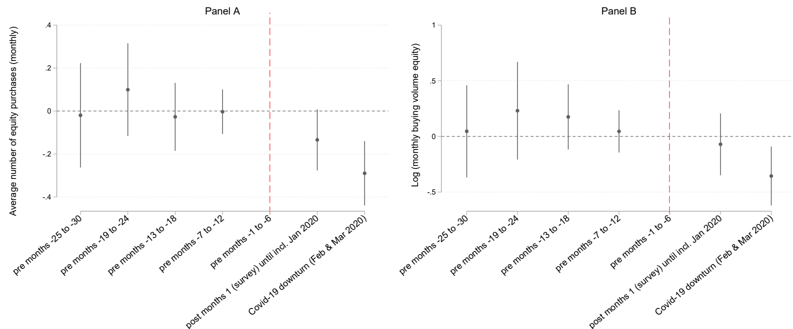
- Laudenbach, Weber, Weber and Wohlfart (2022):
  - Surveys of German **retail investors** at an online bank.
  - Measure beliefs about the autocorrelation of annual returns, documenting **beliefs in mean reversion** before the intervention.
  - Inform random half of respondents of the **close-to-zero historical autocorrelation**.
  - Examine trading responses measured in merged **administrative account data** from the bank.

Laudenbach et al. (2022): Treatment effects on perceived autocorrelation

	No sense to buy after high return		Positive return more likely after high return	
	(1)	(2)	(3)	(4)
Treatment	-0.054		-0.147***	
	(0.044)		(0.045)	
Treatment × Extrapolator (diff. $\geq$ 4) (a)		0.021		-0.375***
		(0.114)		(0.115)
Treatment × Neutral (-4 $\leq$ diff. $<$ 4)		0.075		-0.084
		(0.080)		(0.081)
Treatment × Mean-reverter (diff. $<$ -4) (b)		-0.155***		-0.114*
		(0.060)		(0.062)
Extrapolator (diff. $\geq$ 4)	-0.018	0.008	0.143**	0.288***
	(0.071)	(0.098)	(0.072)	(0.102)
Mean-reverter (diff. $<$ -4)	0.046	0.160**	-0.127**	-0.113
	(0.051)	(0.070)	(0.053)	(0.072)
p-value (a=b)		0.174		0.047
Observations	1,961	1,961	1,961	1,961
R-squared	0.08	0.08	0.04	0.04

Notes: All outcome measures are z-scored using the mean and the standard deviation in the sample. Robust standard errors are in parentheses. * denotes significance at 10 pct., ** at 5 pct., and *** at 1 pct. level.

Laudenbach et al. (2022): Treatment effects on trading adjustments to Covid-19 crash



Notes: This figure displays treatment effects on different measures of the buying behavior of respondents believing in mean reversion before the intervention. The period spanning the 6 months preceding the survey is omitted. All specifications control for month-year as well as individual fixed effects, non-interacted dummies for event periods, and lagged log financial wealth held at the broker. 95-% confidence bands are obtained using standard errors that are two-way clustered by investor and trading-month.

Recap and important take-aways

- Households' stock return expectations are ...
  - ... heterogeneous.
  - ... dependent on recent realized returns.
  - ... pro-cyclical.
- Pessimistic return expectations offer an explanation for **non-participation** of large parts of the population.
- The empirical elasticity of portfolio shares to return expectations is **smaller** than predicted by benchmark models.
  - Likely due to frictions such as inattention or lack of confidence.
- Experimental evidence points to a **causal role** of beliefs in shaping investment decisions.

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