Demand-Based Expected Returns

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Discussion

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Outline

1. Brief recap

2. Comments

Brief recap

1. Theory:

- Assume investor i has a growth-optimal portfolio $\boldsymbol{\theta}_i \implies$ SDF $M_i = (\boldsymbol{\theta}_i' \boldsymbol{R})^{-1}$
- Implies subj. expected market return is

$$\mathbb{E}^i[R_m] = \frac{1}{R_f}\mathbb{E}^{\mathbb{Q}}[(\boldsymbol{\theta}_i' \boldsymbol{R})R_m] \approx \boldsymbol{\theta}_i' \, \mathbb{E}^{\mathbb{Q}}[\boldsymbol{R} R_m]$$

- If $\boldsymbol{\theta}_i$ has only index & index options, then $\mathbb{E}^{\mathbb{Q}}[\boldsymbol{R}R_m]$ is observable [Carr & Madan 2001]
  $\implies$ can recover subjective expectation $\mathbb{E}^i[R_m]$. [Paper has further results I'll return to later.]

2. Empirics:

- Using daily CBOE orders by investor type, create $\boldsymbol{\theta}_{i,\text{options}}$ for $i \in \{\text{customers, market makers}\}$
- Then infer $\boldsymbol{\theta}_i = (\theta_{i,\text{market}}, \boldsymbol{\theta}_{i,\text{options}}')'$ under different assumptions on the share α invested in market
- Customers are typically net holders of put options, for which $\mathbb{E}^{\mathbb{Q}}[R_{\text{put}} \, R_m] < 0$
  $\implies$ their inferred beliefs are much lower than MMs' inferred beliefs ($\sim$4% vs. 7%)
- Positions shrink after crises hit $\implies$ acyclical cust. beliefs, still countercyclical MM beliefs

Brief recap

Countercyclical inferred MM beliefs (in line with surveys), lower and less cyclical customer beliefs:

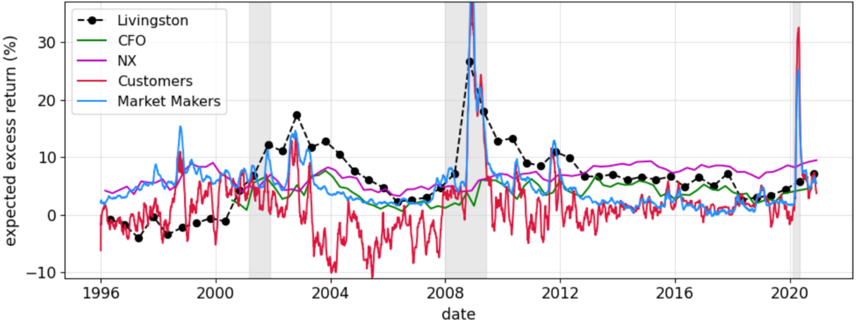


Figure 9. Subjective Expected Market Return from Survey Data, Customers and Market Makers
Notes: This figure plots the time-series of the expected market premium (p.a. in %) for market makers and customers (with $\alpha = 0.9$) together with survey data from Nagel and Xu [2023] (NX), the Graham and Harvey survey (CFO), and the Livingston Survey. Data runs from January 1996 to December 2020. Gray bars indicate NBER recessions.

Outline

1. Brief recap

2. Comments
   - Positives
   - Beliefs vs. preferences/constraints
   - Assets outside the measured portfolio

1. Positives

I like this general idea for a few reasons:

- Burgeoning demand-based AP literature [Koijen & Yogo 2019, . . .]: typically assume "preferences" for asset characteristics (and "latent demand") & identify parameters using IV given holdings data
- "Latent demand"–based explanations for differences in holdings are hard to interpret.
  Much clearer & more intuitive interpretation: differences in beliefs.
- The paper also doesn't require instruments to identify demand parameters: clear theoretical identification approach without all the structure imposed in the demand system literature.
- I also like the idea to make use of option holdings data in a structured way.
- Plenty of papers have used net buy/sell orders, but aggregating up to holdings (and using them in this way) seems novel and worthwhile.

2. Beliefs vs. preferences/constraints

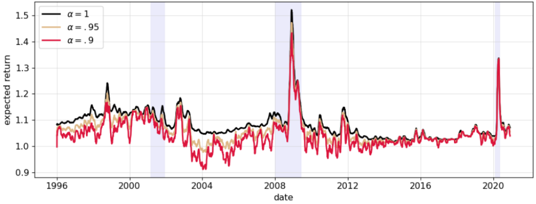
I'm less sure how to interpret the inferred expectations:

- Public customers are typically thought to buy put options as **insurance**, not due to pessimistic beliefs
- Market makers' role is to meet customer demand, so they provide this insurance at some spread
- Positions shrink during crises because intermediaries face tighter constraints at those times [Chen, Joslin, Ni 2019], not necessarily because customer beliefs & demand have changed
- Demand for insurance is not, in principle, ruled out here: there's *some* return distribution for which the growth-optimal portfolio features the index + puts
- But this demand, and MMs' willingness to write these contracts, is often modeled as reflecting differences in risk aversion [e.g., Gertler & Kiyotaki 2015], not beliefs
- Growth-optimal portfolio assumption implies $\gamma_{t,\text{cust}} = \gamma_{t,\text{MM}} = 1$. Authors note that if $\gamma > 1$, their estimate gives **lower bound** for expected returns [w/ weak assumptions, $\mathbb{E}^{\mathbb{Q}}[(\boldsymbol{\theta}_i'\boldsymbol{R})R_m] < \mathbb{E}^{\mathbb{Q}}[(\boldsymbol{\theta}_i'\boldsymbol{R})^{\gamma}R_m]$].
- But if $\gamma_{t,\text{cust}} > \gamma_{t,\text{MM}}$, then the bound will be **tighter** for MMs than for customers $\Longrightarrow$ customers will seem more pessimistic, but this just reflects that their bound for ER is looser given their higher RRA.
- And when MM constraints bind, holdings no longer reflect beliefs.

2. Beliefs vs. preferences/constraints

Constraints pose issues that seem hard to address. Outside of crises, though, some ideas:

1. Paper reports bounds for a range of different values for share α invested in market:



A. Lower Bound Customers Subjective Expected Returns

My view: More informative exercise to fix α and report point estimates for a range of γ values.

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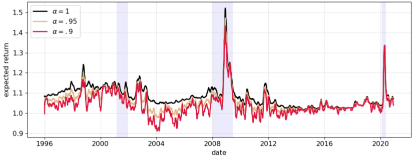

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2. For time-varying RRA, could use external estimates of γ_t [e.g., Bekaert, Engstrom, Xu 2022] and then estimate implied ER using this
3. More ambitiously: Estimate γ_t as value that minimizes pricing error subject to requirement that the holding-implied SDF is decreasing in the index return.
   - Intuitively: There are some option positions (e.g., straddles) that can't be rationalized as providing insurance. This suggestion is a structured way to estimate γ_t (and resulting ER) to take advantage of this, while respecting that the underlying is the benchmark over which the customer is risk-averse.

3. Assets outside the measured portfolio *(time permitting)*

A further challenge, with more ambiguous consequences:

- Recall: For $\mathbb{E}^i[R_m] = \boldsymbol{\theta}_i' \mathbb{E}^{\mathbb{Q}}[\boldsymbol{R} R_m]$, need $\boldsymbol{\theta}_i$ to have only index & index options so that $\mathbb{E}^{\mathbb{Q}}[\boldsymbol{R} R_m]$ is an observable function of the index return.
- In reality, investors hold a wide variety of outside assets in their portfolio.
- Might think richer holdings data could help sidestep this, but then $\mathbb{E}^{\mathbb{Q}}[\boldsymbol{R} R_m]$ wouldn't be observable
  - $\boldsymbol{R}$ would contain returns on other assets, so would need **joint options** on those assets & the index
- Authors address this by deriving bounds s.t. L^2 distance between observed $\boldsymbol{\theta}_i$ and truth is at most δ. Then estimate bounds with δ set to $1/2$ avg. option bid-ask spread.
- Why does the bid-ask spread serve as a good benchmark for a distance **measured in portfolio shares**?
- What does this mean intuitively? For example, what does it imply about the maximum share of bonds held in customers' portfolios?
- More generally: I'm less sure what direction this non-observability would bias things (if at all), but encourage further discussion to the extent possible.

Final notes

- Really like the idea, and nicely written paper
- Less sure how to interpret empirical estimates given importance of insurance demand & intermediary constraints in explaining option holdings
- But the framework (making use of holdings data to discipline beliefs) is novel & appealingly simple, so think it's a promising start

Thank you!