Discussion of:

Equity Valuation Without DCF

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Fixing DCFs

- We teach our MBAs that the value of any security is the sum of Discounted value of all future Cash-Flows (DCF):

$$V_{i,t} = \sum_{\tau=1}^{\infty} \mathbb{E}_t \left[\frac{1}{(1+r)^{\tau}} D_{i,t+\tau}, \right]$$

- and that in efficient markets where $P_{i,t+\tau} = V_{i,t+\tau}$, $\mathbb{E}_{t+\tau}[r_{i,t+\tau+1}] = r \ \forall \tau > 0$.
- No one, including the value investors Columbia educates, calculates fundamental value this way.
  - If you try to plug in estimates of future cash flows and discount rates without proper Bayesian shrinkage, you get ridiculous values.
- *How can you fix this approach?*

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Fixing the price

- This paper proposes an innovative way calculate fundamental value by "fixing" the mistakes in the price:

$$V_{i,t} = P_{i,t} + \sum_{\tau=0}^{\infty} \mathbb{E}_t \left[X_{i,t+\tau} \alpha_{i,t+\tau} \right]$$

- Use firm specific characteristics to estimate the X_is and the α_is relative to a SDF model, such as the CAPM.
- Then, with $V_{i,t}$, you can calculate as misvaluation measure

$$\frac{V_{i,t}}{P_{i,t}} - 1$$

- This can be a measure of how far off prices are from values, and how efficient the market is.

CPR mispricing measure

- In the absence of arbitrage, there always exists a stochastic discount factor M that explains the full cross-section of prices and returns:

$$P_{i,t} = \sum_{\tau=1}^{\infty} \mathbb{E}_t \left[M_{t,t+\tau} D_{i,t+\tau} \right]$$

- Some basic math shows that this SDF/pricing kernel will also explain the full cross-section of average/expected returns. That is, $\forall i$,

$$\mathbb{E}_t \left[M_{t,t+1} R_{i,t+1} \right] = 1$$

and

$$\alpha_{i,t} = \mathbb{E}_t \left[R_{t,t+1} - \frac{1}{\mathbb{E}_t \left[M_{t,t+1} \right]} \left(1 - cov_t(M_{t,t+1}, R_{t,t+1}) \right) \right] = 0.$$

CPR mispricing measure (2)

$$\mathbb{E}_t\left[\alpha_{i,t}\right] = \mathbb{E}_t\left[R_{t,t+1} - \frac{1}{\mathbb{E}_t\left[M_{t,t+1}\right]}\left(1 - cov_t(M_{t,t+1}, R_{t,t+1})\right)\right] = 0$$

- If we find a set of factor returns ($f_{k,t}$) than span this SDF, we will find that time series regressions of (excess) returns on these factors will, in expectation, have an intercept ($\hat{\alpha}_i$) of zero for all assets:

$$R^e_{i,t} = \alpha_{i,t} + \sum_k \beta_{i,k,t-1} f_{k,t} + \epsilon_{i,t}$$

- The problem is that, empirically, the SDFs that are required to explain asset prices are too volatile and don't line up with any macroeconomic shocks related to "risk".
  - Hansen and Jagannathan (1991), Daniel and Titman (2012).

CPR mispricing measure (3)

- Now let's suppose, however, that prices are "wrong", meaning that $P_{i,t} \neq V_{i,t}$ for at least one security.
- Let's call $\widetilde{M}_{t,t+\tau}$ the "true" SDF. For a rational investor *holding the benchmark portfolio*:

$$V_{i,t} = \sum_{\tau=1}^{\infty} \mathbb{E}_t \left[\widetilde{M}_{t,t+\tau} D_{i,t+\tau} \right]$$

- Why is $P_{i,t} \neq V_{i,t}$? It's possible that the representative agent has biased expectations $\tilde{\mathbb{E}}_t$, i.e., that:

$$P_{i,t} = \sum_{\tau=1}^{\infty} \tilde{\mathbb{E}}_t \left[\widetilde{M}_{t,t+\tau} D_{i,t+\tau} \right]$$

- *So, what we want to do to find the "value" is to fix the biased expectations.*

How do we get V?

- One possibility is to find a proxy for expectations, and to "debias" these expectations.
  - This is the approach of the "belifs" literature (see, e.g., Bordalo, Gennaioli, La Porta, and Shleifer, 2024).
- This paper takes a different approach.
- It infers the value-to-price ratio as a function of the firm's future alphas, as predicted by a set of firm characteristics.

V/P ratio as a function of current and future αs

- Since firm "value" ($V_{i,t}$) is explained by the "correct" SDF ($\widetilde{M}_{t+1}$):

$$
\begin{aligned}
V_{i,t} &= \mathbb{E}_t\left[\widetilde{M}_{t+1}(D_{i,t+1}+V_{i,t+1})\right] \\
&= \mathbb{E}_t\left[\widetilde{M}_{t+1}\left(D_{i,t+1}+P_{i,t+1}+P_{i,t+1}\left(\frac{V_{i,t+1}}{P_{i,t+1}}-1\right)\right)\right] \\
\frac{V_{i,t}}{P_{i,t}} &= \underbrace{\mathbb{E}_t\left[\widetilde{M}_{t+1}\frac{(D_{i,t+1}+P_{i,t+1})}{P_{i,t}}\right]}_{=1+\mathbb{E}_t\left[\widetilde{M}_{t+1}\right]\alpha_{i,t}} + \mathbb{E}_t\left[\widetilde{M}_{t+1}\frac{P_{i,t+1}}{P_{i,t}}\left(\frac{V_{i,t+1}}{P_{i,t+1}}-1\right)\right] \\
\Rightarrow \frac{V_{i,t}}{P_{i,t}}-1 &= \sum_{\tau=1}^{\infty}\mathbb{E}_t\left[\widetilde{M}_{t+1}\left(\frac{P_{i,t+1}}{P_{i,t}}\right)\alpha_{i,t+\tau-1}\right]
\end{aligned}
$$

- A firm's misvaluation-ratio is the discounted, CG-adjusted, future alphas.

Measuring Misvaluation

$$\frac{V_{i,t}}{P_{i,t}} - 1 = \sum_{\tau=1}^{\infty} \mathbb{E}_t \left[\widetilde{M}_{t+1} \left(\frac{P_{i,t+1}}{P_{i,t}} \right) \alpha_{i,t+\tau-1} \right]$$

- Now project the firm's valuation ratio (V/P-1) onto a set of characteristics.
- A firm will have large mispricing if:
  - $\mathbb{E}[\alpha_{i,t}|\mathbf{z}_{i,t}]$ is large
  - $\mathbb{E}[\alpha_{i,t+\tau}|\mathbf{z}_{i,t}]$ decays slowly.
    - This *usually* means slow characteristic decay
    - reversal vs. value
  - $\alpha_{i,t+\tau}$ is larger in high MU states.

- However, a high $(V/P-1)$ doesn't necessarily mean that an investor with pricing kernel $\widetilde{M}$ should change their portfolio significantly, or that a large utility gain is possible; *catalysts*.

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Prices or Returns?

- Throughout the paper, there is an emphasis on the idea that we should care about whether the price is right.
- The authors quote Fama, Fisher Black and Warren Buffett in justifying this emphasis on price as opposed to expected return.
  - comment at NBER: "We should be doing asset-pricing, not asset-returning"

- I'm going to argue this emphasis is a little misplaced.
  - The FOC for investor j's optimal investment portfolio is:

$$\mathbb{E}[\tilde{m}_j \tilde{R}_i] = 1 \quad \forall i$$

- It's not clear to me that $P \approx V \Rightarrow$ no big mistakes.
  - e.g, prices can be close to values, but there can be an arbitrage opportunity
  - prices can be far from values, but virtually no portfolio improvement is possible.

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Underpricing or alpha?

- Section 4.2 shows that four famous discretionary investors hold undervalued securities
  - Berkshire Hathaway, Tiger, Capital Group, and Dodge & Cox
- Section 4.3 shows that PE funds tend to buy underpriced companies and sell at a premium price.
- However, there are undoubtedly some firms/funds who trade primarily on short-term alpha.
  - Why do we see this specialization?
- Perhaps it would be more interesting to see who is buying the low $\frac{V}{P} - 1$ firms.

What portfolio *should* investors hold?

- For example, we know that a mean-variance optimizing investor should hold a portfolio with weights:

$$\mathbf{w}^* = \mathbf{\Sigma}^{-1}\boldsymbol{\mu}$$

- Similarly, if there is a single asset with a non-zero alpha, per Treynor and Black (1973),

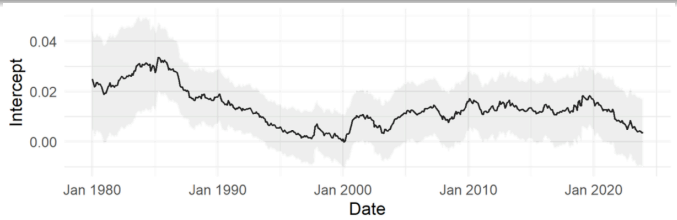
$$SR_p^2 = SR_m^2 + IR_i^2$$

where:

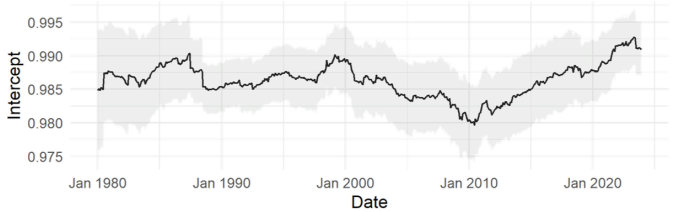
$$IR_i = \frac{\alpha_i}{\sigma_{\epsilon_i}}$$

- *Misvaluation shouldn't matter; alpha and residual risk should*
  - Why are the discretionary and PE investors making mistakes?
- Why are some investors "long-term"?
  - See e.g., Keynes (1936, Ch. 12)

Increased mispricing persistence and decreased alpha payout



Panel C. Mispricing Persistence



- *better future opportunities? coordination*

What about dynamic strategies?

- The misvaluation measure can also be applied to portfolios.
- It presumably can also be applied to dynamic portfolio strategies.
  - *e.g.*, momentum, short-term reversal or i-vol strategies.
- I guessing this isn't what they have in mind. Why?

Conclusions and Suggestions

- Super interesting paper. Lots of great analysis.
- misvaluation measure seems important, but ...
- I would like to better understand how this measure really relates efficiency.
- Why do some investors pay attention to mispricing, and some don't?

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