Misvaluation of Investment Options
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Outline

Overview

Detailed Comments

Outline

Overall Comments

- Intriguing and important ideas.
  - First to estimate and measure mispricing of growth options at firm level.
- Some questions needed to be answered.

Main Idea

- The authors establish a simple model,

$$V_0(K, x) = AP(K, x) + GO(K, x)$$

- The reality is $V(K, x)$, try to structurally estimate the parameters and fit: $\widetilde{V}_0(K, x)$.
  - Parameters are industry level.
  - State variables (K, x) are firm level.

- Measure of undervaluation/overvaluation:

$$M = \frac{\widetilde{V}_0(K, x)}{V(K, x)}$$

- M generates economically significant alpha.

Interpretation

- The relation is only present in firms with high proportions of investment options, or more precisely, firms with high GO/AP ratios.

- Conclusion: **misvaluation of investment options**.

- How can we interpret these results?
  - What are M measuring?
  - Misvaluation or misspecification?
  - What does GO/AP capture?
  - More details on misvaluation?
  - Some more robustness checks.

Outline

What Are *M* Measuring?

- After the scaling effect, the model here has only one state variable: the profit-to-capital ratio π/K,

$$\widetilde{V}_0(K,x) \equiv K\,\widetilde{Q}_0\left(\frac{\pi}{K}\right)$$

  - So the misvaluation measure M is simply a nonlinear function of π/K over average Q:

$$M = \frac{\widetilde{V}_0(K,x)}{V(K,x)} = \frac{\widetilde{Q}_0\left(\frac{\pi}{K}\right)}{V/K}$$

- What are the new information here, as both profitability and BTM have been known pricing factors?
  - Why would this be a new pricing factor?
  - Possibly the nonlinear functional form or the industry-specific parameters matter here.
  - Dig deeper here. For example, would a universal set of parameters generate similar results?

Misvaluation or Misspecification?

- M essentially measures the distance of the model to the reality.
  - The authors have recognized the possibility of model misspecification.
- However, it would still be better if they could rule out more possibilities, even on the empirical side.
- Things to be ruled out include:
  - financial constraints and cash holdings.
  - tangible versus intangible assets.
  - R&D investment intensity.
  - and more.

What Does GO/AP Capture?

- The GO/AP ratio is MONOTONIC to profits-to-capital ratio:

$$\frac{GO}{AP} = \overline{C} \left(\frac{\pi}{K} \right)^{\beta_1 - 1}$$

  - sorting on GO/AP = sorting on profitability (given the same industry parameters).
- Is it equivalent to say the relation between M and returns is only present in high profitable firms?
  - Simply double sort on profits-to-capital ratio then M to check?

More Details on Misvaluation?

- ▶ Suppose the authors have established that there is misvaluation on investment options.
- ▶ More details are still needed:
  - ▶ What kind of misvaluation is that? Is it due to sentiment (systematic behavioral bias) or information asymmetry (unsystematic noise in a rational model)? Additional tests with analyst coverage and dispersion may help.
  - ▶ Is it a systematic risk factor? Or just a short-lived mistake, which is an arbitrage opportunity? Time series performance of the long-short strategy may help.
  - ▶ Why such misvaluation is persistent and time-varying?
  - ▶ Some real life examples help.

Some More Robustness Checks

- When estimating alpha, there are also additional factors to be excluded:
  - sentiment factor
  - Pastor-Stambaugh illiquidity factor
- Extreme misvaluation happens in high R&D, low institutional ownership, and high volatility firms. The authors may also want to control them.