Investors' Information Choice

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Information Choice in Financial Markets

Abstract: *The decision process of an investor who must screen information of varying quality in a stock market with heterogeneous investors leads to new dimensions to consider in the risk-return space. More volatile forecast errors make it more difficult to properly form expectations from forecasts. Investors search among several options to choose the reports that provide them the highest value. I find that the rational informed investor with a searching rule, incorporates both the news about an asset as well as the consistency or volatility of these news, and for two options with the same signal, he prefers the one with the most consistency.*

Key words: *Forecast Error, Searching Rule, Fundamental Value, Informed Investor.*

1 Introduction

Distinguishing the quality of reports can be costly in terms of time, money and cognitive resources (Gabaix and Laibson, 2005) or even can be an impossible task for a subset of reports. This is why, for instance, on April 10 of 2017, the U.S. Securities and Exchange Commission issued an Investor Alert "to warn investors that seemingly independent commentary on investment research websites may in fact be part of paid stock promotion campaigns" after an analyst reported in 2012 through the investment website SeekingAlpha.com, that ImmunoCellular Therapeutics had produced a cancer treatment which was less costly than the alternative in the market, without disclosing that the writer was paid to issue that report. As one can intuit, the quality of the reports is far from being standard (Liang et al., 2022). Where a public ranking of analysts exists, an investor is able to follow the best financial professional in the ranking, but there is still a high degree of uncertainty about the accuracy of each report made by this analyst as the fundamental value of an asset is an unobservable variable (Fischer et al., 2022).

More volatile forecast errors make it more difficult to properly form expectations from analysts' forecasts and investors face a variety of reports, from the most optimistic to the most conservative. In this article, I study the investment decision in a stock market with heterogeneous investors, when the rational informed investor must first screen analysts' reports of varying quality. I find that the informed investor with a searching rule à la Anderson and Renault (1999), incorporates both the news about an asset as well as the consistency or volatility of forecast errors, and for two options with the same signal, he prefers the one with the most consistency.

This paper relates to a strand of literature that studies the informational value of analysts forecasts. I show that investors value analysts that exhibit lower error volatility even if these are biased. This is important in an era of robo-advisers since these robo-analysts tend to issue buy, hold, and sell recommendations with more balanced distributions than the recommendations of human analysts (Coleman et al., 2022). Variation in analyst recommendations affect stock returns specially for firms with higher uncertainty on their fundamental value (Kim et al., 2021). Importantly, the presence of uninformed investors in the stock market is a fertile soil for inflated forecasts since optimistic reports still reveal valuable information to informed investors while increasing the responsiveness of the uninformed (Kartik et al., 2007). Moreover, this paper adds to the literature on search costs in financial markets. Differences in error volatility and the need of a searching process on valuable information plausibly stops the market from concentrating all the demand for analyst reports, in those analysts with the lowest error or highest forecast accuracy. Similarly, Sirri and Tufano (1998) argue that investors in the equity funds market fail to flee from lower performing funds because of searching costs and Hortaçsu and Syverson (2004) find that dispersion in

fund fees and the existence of a large number of funds is explained by search frictions. This literature is relevant as cognitive resources are limited and they must be allocated properly just like other scarce resources (Gabaix and Laibson, 2005).

2 Consistent Mistakes

An analyst that half of the time issues reports with projections on target prices (earnings per share) that are 5 dollars above the realized stock price (earnings per share), and half of the time issues projections 5 dollars below realized prices (earnings per share), will exhibit an average forecast error of zero. But these reports are less informative than those issued by an analyst who consistently reports forecasts that are 6 dollars above the realized values, as the investor can use these incorrect -but consistent- reports as predictable transformations of realized values (Hilary and Hsu, 2013). In spite of observed forecasts not being biased in a deterministic amount, an analyst i that is making a prediction η_i on a fundamental value Φ, even if his forecast error $\varepsilon_i = \eta_i - \Phi$ has an expectation μ_i different than zero, is more valuable for an investor than another analyst j, as long as the volatility σ_i^2 of his errors is lower than that of j. To the extreme, if σ_i^2 was equal to zero, then the investor could systematically predict the fundamental value, even if the provided estimation was different to the fundamental value at any point of time.

3 The Stock Market

In a scenario where rational speculators counter the deviations of stock prices by trading against less rational investors, one would expect that issuing accurate forecasts should be a matter properly modeling the data generating process of the history of prices. Unfortunately, there are no informationally efficient markets (Grossman and Stiglitz, 1980) and the success of any forecast heavily depends on the realized prices in a market with heterogeneous investors (Múnera and Agudelo, 2022), including informed investors, uninformed investors and noise traders, or positive feedback traders as referred by De Long et al. (1990). In a simple case with four dates from 0 to 3 and a stock that pays a dividend at date 3, we can think of investors as trying to make profits on a stock that pays $\Phi \in \{-\phi, 0, \phi\}$ plus a risky amount θ. Notice as shown in figure 1, that the relevant decisions take place at dates 1 and 2. At periods 1 and 2 the market clearing conditions with heterogeneous agents are

$$\begin{aligned} t = 1: &\quad 0 = D_1^s + \delta D_1 + (1-\delta) D_1^u \\ t = 2: &\quad 0 = D_2^s + \delta D_2 + (1-\delta) D_2^u \end{aligned} \tag{1}$$

for a market with a measure of $1 > \delta > 0$ of informed investors, $1-\delta$ of uninformed investors and positive feedback traders that exist in a measure of 1. An informed rational investor is characterized by the fact that he acquires information or receives an early signal η_i about Φ, in order to take a decision on his investments (Grossman and Stiglitz, 1980; De Long et al., 1990) while the uninformed investor incorporates the value of Φ only when it is public at date 2. For the positive feedback trader only past prices are relevant and his demand at date 2, D_2^s, is described by a function of past stock prices $D_2^s = \beta(p_1 - p_0)$.

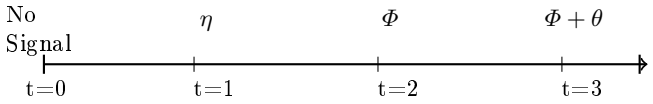

Figure 1: Information Sequence.

For a known distribution of θ and a known joint distribution of (η, Φ), the maximization of the mean-variance utility over the certainty equivalents provides the demand of the informed investor. Assume as in (De Long et al., 1990), that $\mathbb{P}(\eta = \phi, \Phi = \phi) = \mathbb{P}(\eta = \phi, \Phi = 0) = \mathbb{P}(\eta = -\phi, \Phi = -\phi) = \mathbb{P}(\eta = -\phi, \Phi = 0) = \frac{1}{4}$ and that $\theta \sim N(0, \sigma_\theta^2)$. Whenever the investor with a Bernoulli utility function[1] $u(x) = -e^{-\gamma x}$ receives a signal $\eta = \phi$ at period 1, the available certainty equivalents of period 2 are

$$\begin{aligned} w_{2a} &= D_1\left(\phi + \frac{\beta-\alpha}{\alpha}p_1\right) + \frac{\beta^2 p_1^2}{2\alpha} \quad ; \quad \alpha = \tfrac{1}{2\gamma\sigma_\theta^2} \\ w_{2b} &= D_1\left(\frac{\beta-\alpha}{\alpha}p_1\right) + \frac{\beta^2 p_1^2}{2\alpha} \end{aligned} \tag{2}$$

4 The Value of Consistency

Analysts worldwide make their best efforts to provide valuable forecasts for investors (Stickel, 1992). In turn, investors pay the costs of searching, acquiring and processing the available forecasts which they incorporate in their decision making. Retail investors tend to incorporate the information of the more optimistic reports (Mikhail et al., 2007), institutional investors tend to take decisions by looking at several reports in order to unwind the higher weighting of good news in analysts' forecasts (Hugon and Muslu, 2010) and forecast errors with a lower standard deviation have greater ability to move stock prices (Hilary and Hsu, 2013). The informed investor that incorporates the signal η_i provided by analyst i, takes his investment decision by maximizing the expectation of his utility function

$$u(w) = -e^{-\gamma\left\{D_1\left(\phi + \frac{\beta-\alpha}{\alpha}p_1\right) + \frac{\beta^2 p_1^2}{2\alpha}\right\}} \tag{3}$$

[1] with risk aversion γ and wealth x.

With $\eta_i = \Phi + \varepsilon_i, \quad \varepsilon_i \sim N(\mu_i, \sigma_i^2)$, the expected utility, i.e. the mean - variance utility function at period 1 is

$$U = D_1\bar{\eta}_i + D_1 a p_1 + b p_1^2 - \gamma\sigma_i^2 \tag{4}$$

where $\bar{\eta_i} = \mathbb{E}(\eta_i)$, $a = \frac{\beta-\alpha}{\alpha}$ and $b = \frac{\beta^2}{2\alpha}$. The investor that incorporates an analyst report, when making his investment decision, is concerned about both, the estimated fundamental value he gets from analyst i and the accuracy or consistency of this analyst. The investor sticking to analyst i, would prefer this analyst to report higher fundamental estimates with lower inconsistency.

5 Screening Analysts

As analysts provide public forecasts, investors can choose to sample more than one analyst. In doing so, an investor ponders his incremental expected utility from searching an additional option (Anderson and Renault, 1999), or one more analyst. Assume the investor's current best option is an analyst of consistency σ_*^2 who issues the signal $\bar{\eta_*}$. If the investor samples another analyst at which he expects consistency σ_i^2, he will prefer to incorporate his signal η_i if

$$\begin{aligned} &D_1\bar{\eta}_i + D_1 a p_1 + b p_1^2 - \gamma\sigma_i^2 > D_1\bar{\eta}_* + D_1 a p_1 + b p_1^2 - \gamma\sigma_*^2 \\ &D_1\bar{\eta}_i > x; \quad x = D_1\bar{\eta}_* + \gamma[\sigma_i^2 - \sigma_*^2] \end{aligned} \tag{5}$$

For the same fundamental average estimations ($\bar{\eta}_* = \bar{\eta}_i$), the investor prefers analyst i whenever i is more consistent ($\sigma_*^2 > \sigma_i^2$). With a cross-average forecast error $\bar{\varepsilon}$ distributed $N(\Phi, \sigma^2)$ across analysts, the investor's indifference point $D_1\bar{\eta} - x = 0$ for any two alternatives, yields the expected incremental utility from searching one more analyst

$$\int_x^\infty (D_1\bar{\eta} - x) f(\bar{\eta}) d\bar{\eta} \tag{6}$$

The greater the consistency expected from a new potential analyst (smaller σ_*^2), the smaller the value of x and, for any signal $\bar{\eta} > x$, the greater the expected incremental utility from searching one more analyst[2]. These results help explaining the empirical relation of forecast error volatility and stock prices, as presented in (Hilary and Hsu, 2013). In particular, forecasts with consistent forecast errors are more informative in stock markets than accurate forecasts and consistent analysts face a lower probability of being demoted. This suggests that differences in error volatility and search costs allow the existence of systematically biased analysts in the market of information intermediaries as the absence of these two characteristics would yield an information market where the demand for equity research would all be channeled to the least biased analyst.

[2]This searching rule has an optimal stopping rule. See Kohn and Shavell (1974) and Anderson and Renault (1999)

6 Conclusions

The quality of reports in the market of information intermediaries is heterogenous. In this research I study the decision making process of an investor with a search rule à la Anderson and Renault (1999) who must decide on which signal to incorporate when analysts issue forecasts of varying error volatility. In a market with investor heterogeneity à la De Long et al. (1990), the informed rational investor ponders the news about an asset contained in a report as well as the volatility of forecast error. Importantly, for two options with the same information on the fundamental value, he prefers the option with the most consistency. This is in line with previous literature on sell-side analysts. In a market with investors of heterogeneous ability to establish the quality of analysts' reports, uninformed investors allow analysts to issue inflated forecasts as optimistic reports reveal valuable information to informed investors (Kartik et al., 2007). To the opposite extreme, literature shows that some people are willing to stick to predictions that are blatantly useless (Powdthavee and Riyanto, 2015). The fact that some investors invest more in their search process, is also a plausible argument to explain the existence of systematically biased analysts in the market of financial advisers since in a market without search costs and no differences in error volatility, the least biased analyst would obtain all the attention..

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