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Affect and stock returns☆

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ABSTRACT

We argue that affect plays an important role in pricing models for stocks. We exploit a novel dataset of opinions shared on a social media platform to quantify the affect associated with stocks. We show that individual stock opinions collected from a social media platform systematically differ from other risk factors and qualify as an additional factor in asset pricing models. Stocks with high affect feature smaller risk premiums.

The influence of investor sentiment on asset prices has been well analyzed (see, e.g., Huang et al., 2014). Research has shown that investor sentiment has implications for the cross-sectional returns of stocks with subjective valuation components (Baker and Wurgler, 2006, 2007). The key idea in this research area is that people with high sentiment tend to make overly optimistic choices. For example, Shefrin (2001, 2005) studies how sentiment affects the traditional pricing kernel and shows that the log-pricing kernel can be decomposed into two stochastic processes—one related to fundamentals and one to sentiment. Building on these insights, Pot and Shefrin (2014) augment the Consumption Capital Asset Pricing Model (CCAPM) with sentiment to allow for systematic investor error in forming beliefs.[1] To date, literature captures these systematic errors at the market level. The market view is favored by the fact that sentiment in general, but especially at the individual stock level, is not directly observable and thus difficult to test empirically. However, many of the systematic investor errors origin at the individual stock level.[2] While some stocks are systematically evaluated overly optimistic, others may be systematically evaluated overly pessimistic. We argue that affect plays a key role in the formation of systematic investor errors at the individual stock level. In our study, we analyze whether affect plays a role in the pricing models for stocks and qualifies as an additional factor in asset pricing models.

We equate sentiment at the individual stock level with the affect of investors towards that investment opportunity (see also Kaplanski et al., 2015). Slovic et al. (2002) define *affect* as the "specific quality of 'goodness' or 'badness' (1) experienced as a feeling state (with or without consciousness) and (2) demarcating a positive or negative quality of a stimulus". The authors continue to note that "[a]ffective responses occur rapidly and automatically" (Slovic et al., 2004). Nygren et al. (1996) show that positive affect leads subjects to overestimate positive probabilities. Building on this observation, we follow Johnson and Tversky (1983) who argue that higher affect would lead to a lower perceived risk (see also Slovic, 1987).

The perceived risk of any investment opportunity is influenced by the affect towards that investment choice (Yazdipour

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[1] Similarly, Ho and Hung (2009) use survey sentiment measures as proxies for investor sentiment to analyze whether investor sentiment provides conditioning information in asset-pricing models that helps capture well-documented anomalies on risk-adjusted returns of individual stocks.

[2] A large body of literature discusses the fact that investors hold poorly-diversified portfolios (see, e.g., Calvet et al., 2007; Campbell, 2006; Goetzmann and Kumar, 2008; Polkovnichenko, 2005) which indicates that investors decide on their equity investments at the stock level, not at the market level.

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and Neace, 2013). Investment opportunities with low affect are perceived more risky, while investment opportunities with high affect are perceived less risky. Consequently, the perception of news and the affect towards individual stocks may contain valuable information for future stock returns that qualify as a risk-factor.

The five-factor model by Fama and French (2015) is designed to capture the relation between average return and four established patterns in average returns that cannot be explained by the Capital Asset Pricing Model (CAPM) of Sharpe (1964) and Lintner (1965). The four patterns included in the model are size, the book-to-market price ratio, profitability, and investment. Empirical tests of the five-factor model are based on the time-series regression

$$R_{it} - RF_t = \alpha_i + b_i(RM_t - RF_t) + s_iSMB_t + h_iHML_t + r_iRMW_t + c_iCMA_t + \epsilon_{it}.$$

Motivated by the presented evidence, we add affect to the five-factor model,

$$R_{it} - RF_t = \alpha_i + b_i(RM_t - RF_t) + s_iSMB_t + h_iHML_t + r_iRMW_t + c_iCMA_t + a_iAFF_t + \epsilon_{it}. \quad (1)$$

AFF_t is the difference between the returns on diversified portfolios of stocks associated with high and low affect.

Until recently, investors would have to rely on infrequent surveys in order to quantify the affect associated with investments. Social media platforms with investment and stock-assessment focus changed these circumstances. Users' willingness to share their opinions regarding individual stocks allows investors to approximate the affect associated with individual stock investments.[3] We exploit data from one of these new social media platforms, allowing us to perform a large-scale analysis of a stock-specific measure of affect for the first time. Our empirical investigations are based on crowd stock opinions obtained from the social trading platform *Sharewise* (www.sharewise.com). Our dataset covers 2970 different US-stocks over the 96-month sample period from August 2007 to July 2015 with 65,057 stock-month observations.[4] We rely on *Sharewise* data, because the platform offers an instant and standardized forum for sharing stock opinions. The platform queries individual stock price assessments from its users in form of a quantified target price and provides data on their expected target prices. Thus, the data does not suffer from interpretative issues regarding verbalized opinions (e.g., expressed in textual form as a comment).

We show that the individual stock opinions collected from the *Sharewise* platform qualify as an additional risk factor in pricing models. The new factor easily clears the hurdle proposed by Harvey et al. (2016) of a t-statistic larger than 3. We find that stocks with high affect, i.e. stocks with a high stock opinion, feature a smaller risk premium and portfolios constructed with respect to affect do not exhibit an alpha significantly different from zero. Our analysis shows that the proposed risk factor systematically differs from other risk factors. Thus, we contribute to the large literature on asset pricing by introducing a novel factor that is able to capture the perception of information and risk of individual stocks.

The major challenge associated with our data is that we do not capture a pure measure of affect. Instead, individual stock price opinions capture a mixture of the estimates of two related stochastic processes: The opinions measure news and fundamental information and how the information is perceived at the same time. However, exploiting data on fundamentals and news information provided by *Quandl* we demonstrate that the individual stock price opinions do not just reflect fundamentals or news.

We honor the concerns raised by Kan and Zhang (1999): More than 90% of the t-statistics of the first-stage regressions indicate that the betas on the new factor are not equal to zero (see also Chen et al., 1986; Ferson and Harvey, 1993) and split sample regressions with subsamples produce very similar coefficients for all subperiods.

Affect has been documented to play a role in asset pricing before. Stocks with positive affect have been shown to exhibit lower returns than stocks with negative affect (Statman et al., 2008). Especially in the context of initial public offerings, imagery and affect associated with securities have been shown to be a powerful basis to quantify the worth of investments (MacGregor et al., 2000). While these earlier studies rely on surveys to quantify affect towards an industry, we provide the first large-scale analysis on the role of affect using frequent social media data which allows investors to pursue investment strategies based on affect.

1. Data

We rely on data obtained from the social trading platform *Sharewise* for our analysis. On the platform, users can share opinions and price targets regarding the expected development of all individual stocks worldwide. The platform host *Sharewise* then aggregates all user opinions into a crowd investment advice and publishes the user advice together with past stock performance and firms' fundamental data provided by *Thomson Reuters*.

On *Sharewise*'s welcome page, visitors can find price information for major stock market indices around the world and the crowd investment advice of the five stocks with the currently largest under- and overpricing as suggested by platform users. Scrolling down, the welcome page presents a list of the five stocks with the highest and lowest returns of the current trading day and the latest updates of the crowd opinion. Furthermore, website visitors can find information about the *stock of the day*, a *featured prediction* from a selected user, a *featured portfolio*, and *featured news* on the welcome page.

On individual stock pages, users can find fundamental and news information together with the current aggregated crowd opinion for a large number of stocks (see Fig. 1). Platform providers report technical data such as the stock's name, ISIN, and the primary listing exchange, together with the firm's industry and home country. Additional information include the current share price, the target price according to the crowd opinions, fundamental analysis, and analysts' assessments. Information regarding historical performance, beta, market capitalization, dividend yield, earnings ratio, and several other factors are presented on *Sharewise* in addition to a small chart depicting recent stock movements.

All user opinions that were shared on the platform contribute to the aggregated crowd opinion of a stock calculated by platform providers. We present exemplary observations of our data in Table 1. Every observation in our data contains the date, the ISIN of the underlying, a unique identifier, the number of users who submitted a recommendation to buy or sell the stock, and the average expected price as the stock opinion of the crowd.

The aggregated crowd opinion constitutes the main input data to estimate our risk factor. Exploiting the aggregated crowd opinion, we estimate the perceived mispricing of a stock in percent using daily stock prices from *Thomson Reuters Datastream* and form our portfolios with respect to the perceived mispricing.

To ensure that several minor data errors first reported by Ince and Porter (2006) do not influence the results of our study, we

[3] Amongst others, informed investors have an incentive to share their investment strategies and convince fellow investors to follow their investment approach to accelerate the convergence of market prices to the true value as perceived by informed investors (Chen et al., 2014). Other factors include altruistic behavior (Ma and Chan, 2014) and utility gain from the attention users receive for sharing accurate predictions (Chen et al., 2014).

[4] Our sample period is limited by the launch of the social media website in 2007 and our data access in July 2015.

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