



## Investor mood and financial markets

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### ABSTRACT

Numerous studies in recent decades have linked investor mood and financial market behavior, but most works have been empirical investigations. This paper bridges the gap between empirical findings and financial theory. By slightly modifying the Lucas (Lucas, R.E., 1978. Asset prices in an exchange economy. *Econometrica* 46, 1429–1445.) model, this study shows how investor mood variations affect equilibrium asset prices and expected returns.

Analysis results indicate that both equity and bill prices correlate positively with investor mood, with higher asset prices associated with better mood. Conversely, expected asset returns correlate negatively with investor mood. Further, the mood effect on asset prices increases when investors are in a good mood, and mood variations exhibit a greater influence on equity markets than on bill markets. Results of this study suggest that investor mood is a vital factor in equilibrium asset prices and returns, and integrating investor mood into asset-pricing models helps to interpret the growing body of seemingly anomalous evidence regarding investor behavior.

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### 1. Introduction

This study attempts to link asset-pricing theory, empirical evidence, and psychological research to enhance knowledge of the role of investor mood in financial markets. In conventional economic analysis, the significance of mood has long been neglected, whether because its influence is perceived as transient and unimportant, or because investors are assumed to be entirely rational. However, the traditional perspective is now under challenge. Ample evidence suggests that mood does significantly influence decision-making, especially when the decision involves risk and uncertainty.

The extent to which investor psychology influences economic behavior has been broadly studied in recent decades (see, e.g. the reviews of Hirshleifer, 2001; Daniel et al., 2002; Nofsinger, 2005; and Lucey and Dowling, 2005). Researchers suggest that mood markedly affects judgment and decision-making, subsequently altering investor behavior. The mood or psychological state of investors when making decisions can affect their preferences, risk assessments and rational cogitations and, ultimately, their investment decisions. Therefore, financial decisions should vary with investor mood.

A strand of empirical research in behavioral finance has accumulated persuasive evidence that stock returns are related to mood proxy variables, such as weather (e.g. Saunders, 1993; Hirshleifer and Shumway, 2003; Krivelyova and Robotti, 2003; Cao and Wei, 2005; Chang et al., 2006; Keef and Roush, 2007; and Shu and Hung, 2009), biorhythms (e.g. Kamstra et al., 2000; Kamstra et al., 2003; and Yuan et al., 2006), and beliefs (Dowling and Lucey, 2005). These studies argue that certain variables affect the mood or emotions of investors and thus influence their decisions. Consequently, asset prices and returns fluctuate with investor mood.

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However, compared to the extensive empirical evidence that mood affects financial markets, its effects on equilibrium asset prices are relatively unsubstantiated. Although some studies in the past decade have modeled investor psychology, most have focused on psychological bias (e.g. narrow-framing, overconfidence, representativeness heuristic, over- and under-reaction, ambiguity aversion and familiarity) or on concern about future feelings (e.g. loss- and disappointment-aversion) rather than on mood variations. Thus, the influence of shifting investor mood on equilibrium asset prices and returns remains an open challenge.

Thus, this study attempts to fill the above gap in the literature by investigating the influence of investor mood variations on financial markets using a simple general equilibrium asset-pricing model. By slightly modifying the Lucas (1978) model, this study demonstrates how slight mood variations can induce financial market fluctuation. Drawing on psychological literature, time preference and risk attitude are employed as mood factors. This analytical work shows that the model satisfactorily explains many financial market phenomena.

This study offers a general equilibrium perspective of the claims that better investor mood is associated with higher asset prices, that mood variations have a greater effect on asset prices when most investors are in a good mood than when they are in a bad mood, and that mood influences equity markets more than it affects bond markets since investing in the former entails increased complexity and uncertainty. Above analytical results are consistent with psychological concepts.

This preliminary study attempts to link traditional asset-pricing models, behavior finance, and psychology. Traditional asset-pricing models have been argued to fail to account for historically observed asset returns as they ignore investor psychology aspects, and empirical research in behavior finance have documented the impact of investor mood on financial markets (see the review of Hirshleifer, 2001; Lucey and Dowling, 2005) while lacking explicit economic theoretical explanation. If only traditional models, or behavioral finance, or psychology could provide a single but fragmentary knowledge for the complexity of investor behavior. Standing alone, each has its limitations. Merged together, their knowledge and insights become more powerful, meaningful, and applicable to the reality. This work links the psychology literature with mood factors and shows that introducing mood factors into a traditional asset-pricing model adequately explains several empirical findings in behavior finance research and also improves understanding of mood in financial markets.

Briefly, this study contributes to the literature by identifying the economic effects of investor mood variations on equilibrium asset prices and returns. In addition to connecting psychology research and asset-pricing theory, this study also bridges the gap between theory and practical evidence. By associating theory, empirical findings, and psychology, this study improves understanding of the role of mood in financial markets. Above all, this study contributes to the growing literature on mood and investor behavior (e.g. Loewenstein, 2000; Mehra and Sah, 2002; Lo and Repin, 2002; Falato, 2009).

The rest of this paper is organized as follows. Section 2 reviews pertinent psychological literature on how mood affects judgment, decision-making, time preferences and risk attitude. Section 3 then summarizes the empirical findings that this study attempts to explain. Next, Section 4 introduces the proposed model and derives the closed-form expressions for the prices and expected returns of equities and bonds. Section 5 analyzes the influence of mood variations on asset prices and returns. Conclusions are finally drawn in Section 6, along with recommendations for future research.

## 2. Psychology literature review

### 2.1. Effect of mood on judgment and decision-making

Traditional economic theory assumes that people are always rational. However, the traditional perspective is arguably unrealistic as it overlooks the influence of mood. Psychological research has amply documented the effects of mood on judgment and decision-making and suggests that mood is an influential factor in preferences (Loewenstein, 1996; Mehra and Sah, 2002), cognitive processes (Isen, 2001), and in the integration of information (Estrada et al., 1997). Mood is arguably an important focusing mechanism in economic decision-making (Etzioni, 1988), and good mood is associated with fast and efficient decision-making (Forgas, 1998).

Mood may cause decision-making to deviate from the optimum or from rationality. Loewenstein et al. (2001) developed a “risk-as-feelings” model that incorporated the influence of mood on decision-making. The model assumed that emotional reactions can influence, and even override, rational cogitations on decisions involving risk and uncertainty, and anticipated emotions influence the cognitive evaluation process and ultimately the decisions.

Of the numerous psychological theories of how mood affects perception, the one quoted most frequently by financial economists is misattribution: people tend to attribute their feelings to the wrong sources, which causes incorrect judgments (Frijda, 1988; Schwarz and Clore, 1983). For example, people in a good mood that is induced by good weather may unconsciously attribute this feeling to favorable life prospects. Schwarz and Clore (1983) found that people tend to rate their life satisfactions much higher on sunny days than on cloudy or rainy days, even though their well being does not change on a daily basis. Similarly, Wright and Bower (1992) showed that happy people are more optimistic and assign higher probabilities to positive events. Forgas and Ciarrochi (2001) asserted that people in a good mood assign a higher value to both actual and potential wealth. Accordingly, Nofsinger (2005) suggested that people in a good mood are more willing to invest in risky assets than those in a bad mood, and vice versa.

Notably, the effect of mood on judgment and decision-making depends on the information environment and the complexity of the decision. According to the affect heuristic theory, using affective impression to make decisions is much easier than judging probability when the decisions are complex or full of uncertainty (MacGregor et al., 2000). Finucane et al. (2000)

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