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## Examining return predictability of industry style portfolios with prior return relative to a benchmark

Abdullah Noman<sup>a</sup>, Atsuyuki Naka<sup>b</sup>, Duygu Zirek<sup>b,\*</sup>

<sup>a</sup> College of Business Administration, Nicholls State University, LA 70310, United States

<sup>b</sup> Department of Economics and Finance, University of New Orleans, LA 70148, United States

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### ABSTRACT

This paper investigates the ability of prior returns, relative to aggregate market returns, to predict future returns on industry style portfolios. The results show that past return differential predicts one-month ahead returns negatively, even in the presence of a set of state variables. The predictability is also found to be robust to alternative specifications and estimation methodologies. A possible explanation is related to dynamic loss aversion among investors. More specifically, when combined with the house money effect, prior relative performance has inverse relationship with degree of loss aversion leading to predictability in the next period returns.

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### 1. Introduction

The impact of the prior performance of an investment on its future market value has received considerable attention in asset pricing and behavioral finance literature. For example, [Berkelaar, Kouwenberg, and Post \(2004\)](#) study the impact of loss aversion on the optimal investment strategy. [Weber and Zuchel \(2005\)](#), [Kumar \(2009\)](#) and [O'Connell and Teo \(2009\)](#) discuss how a prior return affects future risk taking behavior. The existing literature documents that a prior return is influenced on subsequent risk taking, linked to the prospect theory of [Kahneman and Tversky \(1979\)](#). [Li and Yang \(2013\)](#) and [Duxbury, Hudson, Keasey, Yang, and Yao \(2015\)](#) recently analyze aspects of the prospect theory and derive implications of return predictability and investors' behavior toward risk. [Ackert, Charupat, Church, and Deaves \(2006\)](#), [Frino, Grant, and Johnstone \(2008\)](#), [Liu, Tsai, Wang, and Zhu \(2010\)](#) present evidence of house money effect in the risk taking behavior of investors as well as traders. [Froot, Arabadjis, Lawrence, and Cates \(2011\)](#) and

[Hsu and Chow \(2013\)](#) also support the presence of house money effect.<sup>1</sup>

In this paper, we examine whether returns on industry based portfolios can be predicted, where the predicting variable is the differential return between a particular portfolio and a wide market benchmark. If the prior performance has a systematic influence on the investors' decision making, then this should be reflected on the future course of asset returns. We conjecture that investors' risk taking behavior would be affected following the past returns on their investment with reference to a certain market benchmark. If an increase in return differential is observed in the previous period, then this would cause the investors' degree of loss aversion to fall and the subjective discount rate to decrease. In turn, loss aversion predicts the opposite effect, e.g., investor's risk taking behavior reverses following gains or losses. Assuming past outcomes influence future return movements with reversed effects, the slope coefficient in the predictive regressions is expected to be significant and negative.

\* Corresponding author.  
E-mail address: [dzirek@uno.edu](mailto:dzirek@uno.edu) (D. Zirek).

<sup>1</sup> The house money effect refers to the phenomenon of taking more risk after prior gains than prior losses. Refer to [Duxbury \(2015\)](#) for an extensive review of literature of house money effect and related topics.

Our empirical results indicate that for a sample of industry style portfolios, their past returns relative to a benchmark can negatively predict one-period ahead monthly portfolio returns. We estimate three specifications of regression models based on panel data to ensure robustness of our findings. The observed return predictability still remains in the presence of different predictive state variables that capture alternative investment opportunities in the economy. The results are robust to size, book-to-market, and momentum effects regardless of estimation methods. In addition, the predictive power of the past outcome is still found in long horizon regressions. The observed return predictability is interpreted to represent investors' time varying risk aversion. This explanation is closely related to concepts in behavioral finance such as dynamic loss aversion or house money effect.

The current paper contributes to the existing literature in two ways. First, while return predictability is generally investigated using financial ratios (e.g. dividend yields and interest rates), this paper adds to the return predictability literature by introducing an additional predictor variable, which is the prior return differential between each industry portfolio and aggregate market returns. This variable could reveal specific investor behavior in the equity markets. Second, although a number of papers have studied whether the market returns are predictable, return predictability of industry portfolios has not been well explored.<sup>2</sup> Investors often use portfolios based on certain characteristics for their investment position instead of a broad market. As such, it would provide an additional insight regarding the return predictability by focusing on industry based portfolios. [Hong, Jordan, and Liu \(2015\)](#) recently show that industry level trading strategies can generate profits, where profits are resulted from under-reaction to industry level information rather than stock level information. This paper adds to the literature by focusing on industry portfolios.

The rest of the paper is organized as follows. Section 2 reviews the relevant literature and Section 3 outlines hypotheses and methodology. Data descriptions and empirical results are presented in Sections 4 and 5, respectively. Section 6 concludes the paper.

## 2. Return predictability and investor behavior

In the literature, the return predictability has been investigated using a set of state variables, which are either financial ratios (e.g. dividend yield), and interest rates (e.g. term and default spreads). These variables are found to be reasonable proxies for economic states that capture the time variation in risk premiums.<sup>3</sup> A number of papers have used variables other than the conventional ones to predict future returns. For example, [Eleswarapu and Reinganum \(2004\)](#) predict long horizon aggregate stock market returns by past returns of glamor stocks. [Li and Yu \(2012\)](#) show that a measure of investor sentiment can predict future stock market returns even in the presence of traditional predictor variables. [Wahal and Deniz Yavuz \(2013\)](#) find evidence in favor of past style level returns to predict future stock returns. Return predictability is also related to changing risk premiums that can be linked to business cycles. Investors' discount rate may be larger during bad times because of higher volatility returns in this period. [Henkel, Martin, and Nardari \(2011\)](#) shows that return predictability is strong during economic contractions and almost non-existent during expansions.

The loss aversion often implies a role of past performance on an investment in determining future risk taking behavior of investors. [Li and Yang \(2013\)](#) analyze aspects of the prospect theory to derive an implication for return predictability within a general equilibrium framework. They show that good news as well as bad news can result in "reversed disposition effect", e.g., generating a negative relationship between the loss aversion and future expected returns. Investors' risk taking behavior would be affected following the past returns on their investment with reference to certain benchmark.<sup>4</sup> If an increase in return differential is observed in the previous period, this will make investors' degree of loss aversion (or less risk aversion) to fall and subjective discount rate to decrease. Past gains on a stock, compared to some reference point, can lead to a fall in investors' degree of loss aversion and thereby, to a lower discount rate. This phenomenon would push the stock price up in the market and result in lower returns in the next period. The changing risk could generate predictable pattern in future returns.<sup>5</sup>

In the loss aversion setting, the investor always follows a "partial portfolio insurance strategy" as opposed to "general portfolio insurance strategy" of disposition effect, and it is difficult to distinguish between loss aversion and risk aversion ([Berkeelaar et al., 2004](#)). [Dumas, Kurshev, and Uppal \(2009\)](#) examine the effect of the sentiment on the investors' portfolio optimization where both rational and overconfident investors coexist, and show that intertemporal optimization of investors depends on how they process the available information about the future course of the market. The investors' portfolio choice is often related to past performance of financial assets. Behavioral biases of investors often result in past performance being significantly followed by flows of funds. [Bailey, Kumar, and Ng \(2011\)](#) examine the link between investors' trend chasing and a number of behavioral biases, and conclude that these biases cannot account for the observed return predictability in stock markets in the long run.

The house money effect implies that investors would take more risk after prior gains than prior losses.<sup>6</sup> In the original [Kahneman and Tversky \(1979\)](#) formulation, the behavior of the subjects in the experiments is analyzed independent of prior outcomes. In that setting, prior events are seen in isolation and they have no impact on the future risk taking ([Berk & Green, 2004](#)). [Kahneman and Tversky \(1979\)](#) recognize the possibility of situations in which prior outcomes would affect future decisions of the subjects. When prior gains or losses are integrated into decision making, then the degree of risk or loss aversion would be smaller following a recent gain. Similarly, the degree of loss aversion would be larger following a recent loss. In their modeling of investor behavior, [Barberis, Huang, and Santos \(2001\)](#) emphasize this interpretation of prospect theory. They combine the myopic loss aversion of [Benartzi and Thaler \(1995\)](#) with house money effect, describing it as the dynamic loss aversion, and illustrate the observed equity premium puzzle. [Duxbury et al. \(2015\)](#) recently examine the issues of disposition and house money effects. Their results indicate that house money effect reduces the impact of disposition effect using individual investor data from Chinese stock markets. The authors further find that while disposition effect is related to individual stock level, house money effect is rather a portfolio level occurrence.

<sup>4</sup> In general, disposition effect implies that investors tend to sell their assets after the values rise, but to hold them after the values drop.

<sup>5</sup> However, predictable pattern in future returns may not always be exploitable by the investors. [Goyal and Welch \(2008\)](#) show that predictive regressions often perform poor in out-of-sample analysis.

<sup>6</sup> This is also known as dynamic loss aversion ([O'Connell and Teo, 2009](#)).

<sup>2</sup> [Lewellen \(1999\)](#) uses book-to-market ratio to predict future returns at portfolio levels. [Wahal and Deniz Yavuz \(2013\)](#) employ style level returns to predict future stock returns.

<sup>3</sup> Refer to [Lewellen \(2004\)](#), [Ang and Bekaert \(2007\)](#), [Boudoukh, Michaely, Richardson, and Roberts \(2007\)](#), [Campbell and Thompson \(2008\)](#), and among others.

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