



Contents lists available at ScienceDirect

Journal of Empirical Finance

journal homepage: www.elsevier.com/locate/jempfin

Prospect theory and corporate bond returns: An empirical study

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ARTICLE INFO

JEL classification:

D03
G12

Keywords:

Prospect theory
Bond return
Loss aversion
Probability weighting

ABSTRACT

Since the 1980s, prospect theory has been considered as the most successful descriptive theory for decision making. In this paper, we examine the predictive power of prospect theory in the U.S. corporate bond market. The empirical evidence shows that prospect theory has significant predictive power for corporate bond returns, especially for junk bond returns. Unlike the findings for the stock market, the loss aversion component plays the most important role in predicting corporate bond returns. The probability weighting component also plays a predictive role for junk bonds, but not for investment-grade bonds.

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1. Introduction

Kahneman and Tversky (1979) propose prospect theory and Tversky and Kahneman (1992) modify it into the known cumulative prospect theory. Since then, prospect theory has been widely considered to be the most successful descriptive theory for decision making. A number of studies have reported that prospect theory can explain some financial phenomena, such as the long-run underperformance of initial public offerings (IPOs) (Ma and Shen, 2003), skewness of stock returns (Barberis and Huang, 2008), inflation perceptions (Brachinger, 2008), stock option pricing (Gurevich et al., 2009), stock momentum (Menkhoff and Schmeling, 2006), and etc.

Benartzi and Thaler (1995) propose that investors evaluate the stock/bond market by calculating the prospect theory value of its historical return distributions. Barberis et al. (2016) propose a stock-level analog of Benartzi and Thaler's (1995) market-level model. Their empirical evidence shows that prospect theory based on a stock's historical return distributions has significant predictive power for subsequent stock returns.

Although it has been shown that prospect theory has predictive power for stock returns, there is a paucity of studies implementing prospect theory in the corporate bond market. This raises a natural question: Does prospect theory have predictive power in the corporate bond market? Furthermore, unlike the stock market, institutional investors hold most of the investment-grade corporate bonds, while individual investors play an important role in junk bonds.¹ The different investors' structure between the investment-grade and junk bonds provides an ideal setting to test whether institutional investors make decisions differently from individual

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¹ The Securities Industry and Financial Markets Association 2015 report shows that the total outstanding of U.S. corporate bond volume is about \$8 trillion, among which \$6.2 trillion is in investment-grade bonds and \$1.8 trillion is in junk bonds (Acciavatti et al., 2015). Becker and Ivashina (2015) report that insurance companies hold around 70% of the newly-issued investment-grade bonds and less than 40% of junk bonds. Also, dealers may redistribute bonds to individual investors after their issuance (e.g., Goldstein and Hotchkiss, 2007), there are still a significant proportion of the corporate bonds that are held by individual investors. Based on the 2014 Federal Reserve Board report, individual investors owned around 20% of the total outstanding corporate bonds. Since institution investors have stricter capital requirements for bonds with lower ratings, we can infer that individual investors should hold much more than 20% of the junk bonds.

investors. In this paper, we develop our hypotheses around these questions and test them by using both investment-grade and junk bonds.

The essential concept of prospect theory is called “mental accounting” (Kahneman and Tversky, 1984; Thaler, 1985). It involves the mental process of an investor in both coding and evaluating financial assets. For the process of coding a financial asset, the historical return distribution is the most convenient, easily accessible, and intuitive information that investors can get when they make investment decisions. As proposed by Benartzi and Thaler (1995), investors evaluate a corporate bond’s historical returns through a mental mechanism that is captured by prospect theory.

To explain the rationality of this, we start by introducing two closely related concepts in cognitive psychology: System 1 and System 2 thinking processes. In these two concepts of cognitive psychology, people follow a two-step mental procedure when making decisions (Kahneman and Frederick, 2002). Stanovich and West (2000) named them as System 1 and System 2 thinking processes, respectively. System 1 thinking is quick with little consciousness, and is basically pretty primitive. In contrast, System 2 thinking is slower, more reflective, and acquire proficiency and skills. In the first step, people use System 1 thinking to make a quick, intuitive judgment to a problem. There is little effort exerted in this step and it does not require the use of learned rules and skills. In the second step, people use System 2 thinking to evaluate the judgment made in the first step and accept, revise, or override it.

Frederick (2005) uses an example of when people solve the cognitive reflection test problem: If it takes 5 machines 5 min to make 5 widgets, how long would it take 100 machines to make 100 widgets? An intuitive answer to this problem would be 100 min. The thinking process that leads to this intuitive answer is System 1 thinking. A reevaluation of the answer will then recognize that the original 5 machines are enough to make 100 widgets in 100 min. A more careful and elaborative calculation will then lead to the correct answer of 5 min. The thinking process that reevaluates System 1 thinking and may override the incorrect answer from System 1 thinking with the correct answer is System 2 thinking.

System 1 thinking is mainly intuitive, while System 2 thinking is more sophisticated and requires related proficiency and skills. Thus, some individual investors are likely to make decisions based on System 1 thinking, while the decisions of institutional investors are more determined through System 2 thinking. Since prospect theory is a way of quantitatively measuring System 1 thinking, individual investors who rely more on System 1 thinking are more likely to evaluate a bond according to prospect theory. This does not mean that institutional investors’ evaluation procedure does not involve System 1 thinking. In fact, System 1 thinking often involves the entire thinking process even if System 2 thinking also involves (e.g., Frederick, 2005). Therefore, we expect the prospect theory value to have some predictive power for future bond returns, and the predictive power should be stronger for bonds in which individual investors play a more active role, such as junk bonds.

The above discussion leads to the prediction that investors evaluate a bond by its historical return distributions through a mental mechanism that is captured by prospect theory. If the prospect theory value of this bond is higher (lower), then this bond is attractive (unattractive) to investors. Investors tend to tilt toward (away) this bond in their portfolios, causing the bond to be overvalued (undervalued) and to earn lower (higher) future returns. In short, bonds with higher (lower) prospect theory value are attractive (unattractive) to investors, which may cause them to be overvalued (undervalued) and hence earn lower (higher) future returns.

The prospect theory value we employ in this paper, which is constructed to quantitatively measure System 1 thinking, is a transformation of a bond’s historical return distribution. It is constructed in a unique way to capture information in the full bond return distribution, as opposed to other transformations like volatility, skewness, and etc. We show the specificity in the transformations of the prospect theory value by controlling these variables. In addition, we consider the possibility that investors evaluate a bond according to expected utility, instead of prospect theory. We find that the expected utility shows little predictive power for future returns. Although this finding does not provide evidence against the expected utility function, it suggests that the prospect theory value transfers the historical returns in a uniquely informative way that can capture investors’ evaluation process.

Investment-grade bonds and junk bonds are held by different investors, and the market behavior for them is totally different (Avramov et al., 2007; Bao et al., 2011; Lin et al., 2013; Liu et al., 2009; Longstaff et al., 2005). The psychological biases in investment behaviors typically affect individual investors more severely than institutional investors due to their lack of professionalism. Therefore, we expect that the predictability of prospect theory should hold more strongly for bonds held by more individual investors, for example, junk bonds.

In summary, our main empirical prediction is that a bond’s prospect theory value based on its historical return distributions has predictive power for its future returns with a negative sign. This predictive power should be stronger for junk bonds in which individual investors play a more important role.

We test our prediction using corporate bond data from January 1973 to December 2013. Both portfolio and regression analyses show that bonds with higher (lower) prospect theory value will earn lower (higher) future returns. In other words, prospect theory values can predict future returns. Our findings are robust to various specifications of prospect theory value and model specifications. We also find that the predictive power is much stronger for junk bonds, where individual investors typically play a more important role. This finding further supports our prediction that investors evaluate a bond according to its prospect theory value.

We also try to identify which aspect of prospect theory explains why some bonds are appealing to investors. We explore this problem by looking at three embedded components of prospect theory: loss aversion, probability weighting, and concave/convex. We find that unlike the findings for the stock market, the loss aversion component accounts for most of prospect theory’s predictive power in the bond market, while the probability weighting component contributes to the predictability of prospect theory only for junk bonds.

The corporate bond market is largely dominated by institutional investors. Barberis et al. (2001), Haigh and List (2005), and Connell and Teo (2009) show that due to fear of being less respected by their peers, institutional investors are generally more loss-averse than individual investors. The loss aversion of institutional investors explains why the loss aversion accounts for most predictive power of prospect theory in bond market.

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