Prospect Theory & Stock Returns: An Empirical Test

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An example of how we can apply Prospect theory to understand investors' behavior

Prospect Theory and Stock Returns: An Empirical Test

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We test the hypothesis that, when thinking about allocating money to a stock, investors mentally represent the stock by the distribution of its past returns and then evaluate this distribution in the way described by prospect theory. In a simple model of asset prices in which some investors think in this way, a stock whose past return distribution has a high (low) prospect theory value earns a low (high) subsequent return, on average. We find empirical support for this prediction in the cross-section of stock returns in the U.S. market, and also in a majority of forty-six other national stock markets. (*JEL* D03)

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A crucial ingredient in any model of asset prices is an assumption about how investors evaluate risk. Most of the available models assume that investors evaluate risk according to the expected utility framework, and models based

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A crucial ingredient

- A crucial ingredient in any model of asset prices is an assumption about how investors evaluate risk.
- Most of the available models assume that investors evaluate risk according to the expected utility framework. However, Kahneman and Tversky (1979)'s Prospect theory captures these risk attitudes more accurately.

Research Question

Can models in which some investors evaluate risk according to prospect theory help us make more sense of the data on asset prices and asset returns?

What this paper does

- The paper derives the predictions, for the cross-section of stock returns, of a simple prospect theory-based model and test these predictions in both U.S. and international data.

A mental representation of risk

Decision making under prospect theory involves two steps:

- "representation": the individual forms a mental representation of the gains and losses he associates with taking the risk.

- "valuation": the individual evaluates this representation – this distribution of gains and losses -- to see if it is appealing.

A mental representation of risk

- How do investors represent that stock in their minds**?**

- **This paper hypothesizes that** for many investors, their mental representation of a stock is the distribution of the stock's past returns.

A mental representation of risk

- Some investors might see the past return distribution as a good and easily accessible proxy for the object they are truly interested in, namely, the distribution of the stock's future returns.

- A natural mental representation of a stock's past return distribution is the distribution of its monthly returns over the previous five years in investment handbook (the data starting in July 1931 and ending in December 2010)

“Valuation” & Prediction of the paper

- Stocks with **high** prospect theory values will have **low** subsequent returns, on average.
- While stocks with **low** prospect theory values will have **high** subsequent returns.
- The intuition is clear: stocks with high prospect theory values are appealing to some investors; these investors tilt toward these stocks in their portfolios, causing the stocks to become overvalued and to earn low subsequent returns.

Prediction

- The prediction could hold more strongly among stocks more heavily traded by individual investors, for example, among small-cap stocks.

- This is because the behavior that underlies the prediction is relatively unsophisticated and is therefore likely a better description of what individual investors do than of what institutional investors do.

Drawbacks- this paper assumes:

- That individuals evaluate the return distribution of the stock itself; more sophisticated investors would evaluate the return distribution of the overall portfolio.

- That the investors evaluate the stock's past returns; more sophisticated investors would try to forecast the stock's future returns, and would evaluate those.

Data

For U.S. firms, stock price and accounting data are from CRSP(Center for Research in Security Prices, Chicago Booth) universe and Compustat from 1926 to 2010.

For non-U.S. firms, from Datastream

Variables used in analysis

- *TK*: the prospect theory value of a stock's historical return distribution
- *Beta*: a stock's beta calculated from monthly returns over the previous five years, following Fama and French(1992)
- *Size*: the log market capitalization at the end of the previous month
- *Bm*: the log book-to-market ratio
- *Mom*: the cumulative return from the start of month t-12 to the end of month t-2
- *Rev*: the return in month t-1
- *Illiq*: measure of illiquidity
- *Lt rev*: the cumulative return from the start of month t-60 to the end of month t-13
- *Ivol*: Idiosyncratic return volatility
- *Skew*: the skewness of monthly returns over the previous five years
- *Eiskew*: expected idiosyncratic skewness
- *Coskew*: coskewness

Fama-MacBeth test

- Fama-MacBeth test allows us to examine the predictive power of TK while controlling for known predictors of returns.

- Each month, starting in July 1931 and ending in December 2010, the researchers run a cross-sectional regression of stock returns in that month on TK measured at the start of the month and on variables already known to predict returns as controls.

Fama-MacBeth regression analysis

The dependent variable is percentage return

A. TK is constructed using returns from month t-60 to month t-1

	Controls					Skewness controls			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
TK	**−0.107**	**−0.108**	**−0.059**	**−0.050**	**−0.043**	**−0.043**	**−0.046**	**−0.067**	**−0.043**
	(−3.77)	(−4.94)	(−3.07)	(−2.60)	(−2.16)	(−2.18)	(−1.92)	(−2.28)	(−2.16)
Beta		0.132	0.166	0.192	**0.240**	**0.243**	**0.249**	**0.480**	**0.243**
		(1.14)	(1.22)	(1.40)	(1.99)	(2.07)	(2.11)	(2.59)	(2.00)
Size		**−0.132**	**−0.125**	**−0.078**	**−0.097**	**−0.089**	**−0.092**	**−0.066**	**−0.092**
		(−4.07)	(−3.65)	(−2.44)	(−3.38)	(−3.24)	(−3.55)	(−1.94)	(−3.27)
Bm		**0.151**	**0.203**	**0.177**	**0.126**	**0.127**	**0.112**	0.121	**0.124**
		(2.67)	(3.44)	(3.06)	(2.26)	(2.29)	(2.03)	(1.31)	(2.27)
Mom		**0.01**	**0.009**	**0.009**	**0.008**	**0.009**	**0.008**	**0.005**	**0.009**
		(7.99)	(6.47)	(6.73)	(6.39)	(6.47)	(6.30)	(3.44)	(6.55)
Rev			**−0.079**	**−0.079**	**−0.078**	**−0.081**	**−0.082**	**−0.053**	**−0.092**
			(−16.39)	(−16.28)	(−15.20)	(−16.47)	(−16.02)	(−9.64)	(−15.85)
Illiq				**0.286**	**0.597**	**0.622**	**0.631**	**1.299**	**0.620**
				(2.37)	(4.90)	(5.08)	(5.20)	(6.88)	(5.11)
Lt rev					−0.041	−0.039	**−0.035**	−0.000	−0.033
					(−1.40)	(−1.31)	(−1.70)	(−0.04)	(−1.13)
Ivol					**−0.138**	0.068	0.067	0.073	0.068
					(−4.27)	(1.43)	(1.43)	(1.03)	(1.44)
Max						**−0.036**	**−0.036**	−0.022	**−0.036**
						(−3.45)	(−3.42)	(−1.36)	(−3.45)
Min						**−0.059**	**− 0.060**	**−0.093**	**−0.059**
						(−4.50)	(−4.61)	(−6.72)	(−4.56)
Skew							0.013		
							(0.03)		
Eiskew								−0.194	
								(−1.61)	
Coskew									−0.039
									(−0.41)
N	954	954	954	954	954	954	954	276	954

t -statistics, in parentheses, are Newey-West adjusted with twelve lags, and bold typeface indicates a coefficient significant at the 10% level.

Result

- The coefficient on the stock's prospect theory value, averaged across all the monthly regressions, is significantly negative: stocks with higher prospect theory values have lower subsequent returns.

- The predictive power of prospect theory value for subsequent stock returns is stronger among small-cap stocks and stocks less subject to arbitrage – for example, among illiquid stocks and stocks with high idiosyncratic volatility.

- Probability weighting & lottery-like gamble !!!

DANKE!

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