Applications: Prospect theory in the "real world"

Question: What about real life situations? Can Prospect theory explain behaviour?
Here are some answers…

Camerer, Colin, *"Prospect Theory in the Wild: Evidence from the Field."*
In *Choices, Values and Frames*, edited by D Kahneman and A Tversky. Cambridge University Press, 2000.

Nicholas C. Barberis , *"Thirty Years of Prospect Theory in Economics: A Review and Assessment"*, November 20121

http://faculty.som.yale.edu/nicholasbarberis/ptapp_final.pdf

Table 1: Ten field phenomena inconsistent with EU and consistent with cumulative prospect theory

DOMAIN	**PHENOMENON**	DESCRIPTION	TYPE OF DATA	ISOLATED DECISION	INGRED-IENTS	REFRERENCES
Stock market	**Equity premium**	Stock returns are too high, relative to bond returns	NYSE stock, bond returns	Single yearly return (not long-run)	Loss-aversion	Benartzi and Thaler (1995)
Stock market	**Disposition effect**	Hold losing stock too long, sell winners too early	Individual investor trades	Single stock (not portfolio)	Reflection effect	Odean (in press)
Labor economics	**Downward-sloping labor supply**	NYC cabdrivers quit around daily income target	Cabdriver hours, earnings	Single day (not week or month)	Loss-aversion	Camerer et al (1997)
Consumer goods	**Asymmetric price elasticities**	Purchases more sensitive to price increases than to cuts	Product purchases (scanner data)	Single product (not shopping cart)	Loss-aversion	Hardie, Johnson, Fader (1993)
Macro-economics	**Insensitivity to bad income news**	Consumers do not cut consumption after bad income news	Teachers earning, savings	Single year	Loss-aversion, reflection effect	Shea (1994); Bowman, Minehart and Rabin (1996)
Consumer choice	**Status quo bias, Default bias**	Consumers do not switch health plans, choose default insurance	Health plan, insurance choices	Single choice	Loss-aversion	Samuelson and Zeckhauser (1988), Johnson et al (1992)
Horserace betting	**Favorite-longshot bias**	Favorites are underbet, longshots overbet	Track odds	Single race (not day)	Overweight low p(loss)	Jullien and Salanié (1997)
Horserace betting	**End-of-the-day effect**	Shift to longshots at the end of the day	Track odds	Single day	Reflection effect	McGlothlin (1956)
Insurance	**Buying phone wire insurance**	Consumers buy overpriced insurance	Phone wire insurance purchases	Single wire risk (not portfolio)	Overweight low p(loss)	Cicchetti and Dubin (1994)
Lottery betting	**Demand for Lotto**	More tickets sold as top prize rises	State lottery sales	Single lottery	Overweight low p(win)	Cook and Clotfelter (1993)

Examples: Buying & selling prices

A closely related body of research on endowment effects established that buying and selling prices for a good are often quite different.

The paradigmatic experimental demonstration of this is the mugs experiments of Kahneman, Knetsch and Thaler (1990). In their experiments, some subjects are endowed (randomly) with coffee mugs and others are not. Those who are given the mugs demand a price about 2-3 times as large as the price that those without mugs are willing to pay, even though in economic theory these prices should be extremely close together. In fact, the mugs experiments were inspired by field observations of large gaps in hypothetical buying and selling prices in contingent valuations.

Contingent valuations are measurements of the economic value of goods which are not normally traded--like clean air, environmental damage, and so forth. These money valuations are used for doing benefit-cost analysis and establishing economic damages in lawsuits.

There is a huge literature establishing that selling prices are generally much larger than buying prices, although there is a heated debate among psychologists and economists about what the price gap means, and how to measure true valuations in the face of such a gap.

Effects: Endowment effect etc

The buying & selling examples are related to three phenomena:

- status quo biases
- default preference
- endowment effects

All consistent with aversion to losses relative to a reference point. Making one option the status quo or default, or endowing a person with a good (even hypothetically), seems to establish a reference point people move away from only reluctantly, or if they are paid a large sum.

Example: New York cab drivers working hours

Camerer, Babcock, Loewenstein and Thaler studied cab drivers in New York City about when they decide to quit driving each day. Most of the drivers lease their cabs, for a fixed fee, for up to 12 hours. Many said they set an income target for the day, and quit when they reach that target.

While daily income targeting seems sensible, it implies that drivers will work long hours on bad days when the per-hour wage is low, and will quit earlier on good high-wage days. The standard theory of the supply of labor predicts the opposite: Drivers will work the hours which are most profitable, quitting early on bad day, and making up the shortfall by working longer on good days.

The daily targeting theory and the standard theory of labor supply therefore predict opposite signs of the correlation between hours and the daily wage. To measure the correlation, we collected three samples of data on how many hours drivers worked on different days. The correlation between hours and wages was strongly negative for inexperienced drivers and close to zero for experienced drivers.

This suggests that inexperienced drivers began using a daily income targeting heuristic, but those who did so either tended to quit, or learned by experience to shift toward driving around the same number of hours every day.

Daily income targeting assumes loss-aversion in an indirect way. To explain why the correlation between hours and wages for inexperienced drivers is so strongly negative, one needs to assume that drivers take a one-day horizon, and have a utility function for the day.

Example: Equity premium

Stocks (or equities) tend to have more variable annual price changes (or is higher, as a way of compensating investors for the additional risk they bear. In most of this century, for example, stock returns were about 8% per year higher than bond returns. This was accepted as a reasonable return premium for equities until Mehra and Prescott (1985) asked how large a degree of risk-aversion is implied by this premium.

The answer is surprising-- under the standard assumptions of economic theory, investors must be extremely risk-averse to demand such a high premium. For example, a person with enough risk-aversion to explain the equity premium would be indifferent between a coin flip paying either $50,000 or $100,000, and a sure amount of $51,329. So, the additional expected $25,000 to arise from the uncertain part of the gain in the coin flip bet ($50,000, 0.5; $100,000, 0.5) are only acknowledged with $1,329.

Benartzi and Thaler(1997) offer prospect theory based explanation: Investors are not averse to the variability of returns, they are averse to loss (the chance that returns are negative). Since annual stock returns are negative much more frequently than annual bond returns are, loss-averse investors will demand a large equity premium to compensate them for the much higher chance of losing money in a year. (Note: Higher average return to stocks means that the cumulative return to stocks over a longer horizon is increasingly likely to be positive as the horizon lengthens.)

They compute the expected prospect values of stock and bond returns over various horizons, using estimates of investor utility functions from Kahneman and Tversky (1992), and including a loss-aversion coefficient of 2.25 (i.e., the disutility of a small loss is 2.25 times as large as the utility of an equal gain). Benartzi and Thaler show that over a one-year horizon, the prospect values of stock and bond returns are about the same if stocks return 8% more than bonds, which explains the equity premium.

Example: Disposition effect

Shefrin and Statman (1985) predicted that because people dislike incurring losses much more than they like incurring gains, and are willing to gamble in the domain of losses, investors will hold on to stocks that have lost value (relative to their purchase price) too long and will be eager to sell stocks that have risen in value. They called this the disposition effect.

The disposition effect is anomalous because the purchase price of a stock should not matter much for whether you decided to sell it. If you think the stock will rise, you should keep it; if you think it will fall, you should sell it. In addition, tax laws encourage people to sell losers rather than winners, since such sales generate losses which can be used to reduce the taxes owed on capital gains.

Disposition effects have been found in experiments by (Weber and Camerer, 1998).

On large exchanges, trading volume of stocks that have fallen in price is lower than for stocks that have risen.

The best field study was done by Odean. He obtained data from a brokerage firm about all the purchases and sales of a large sample of individual investors. He found that investors held losing stocks a median of 124 days, and held winners only 104 days.

Hold losers because they expect them to bounce back (or mean- revert)? Odean's sample, the unsold losers returned only 5% in the subsequent year, while winners that weres old later returned 11.6%. Tax incentives inverse behaviour.

Example: Racetrack betting

In parimutuel betting on horse races, there is a pronounced bias toward betting on longshots , horses with a relatively small chance of winning. That is, if one groups longshots with the same percentage of money bet on them into a class, the fraction of time horses in that class win is far smaller than the percentage of money bet on them. Horses with 2% of the total money bet on them, for example, win only about 1% of the time (see Thaler and Ziemba, 1988; Hausch and Ziemba, 1995).

The fact that longshots are overbet implies favorites are underbet. Indeed, some horses are so heavily favored that up to 70% of the win money is wagered on them. For these heavy favorites, the return for a dollar bet is very low if the horse wins. (Since the track keeps about 15% of the money bet for expenses and profit, bettors who bet on such a heavy favorite share only 85% of the money with 70% of the people, a payoff of only about $2.40 for a $2 bet.) People dislike these bets so much that in fact, if you make those bets you can earn a small positive profit (even accounting for the track s 15% take).

There are many explanations for the favorite-longshot bias, each of which probably contributes to the phenomenon. Horses that have lost many races ina row tend to be longshots, so a gambler s fallacy belief that such horses are due for a win may contribute to overbetting on them. Prospect theoretic overweighting of low probabilities of winning will also lead to overbetting of longshots.

Examples: Insurance options

Samuelson and Zeckhauser (1988) coined the term status quo bias to refer to an exaggerated preference for the stat us quo, and showed such a bias in a series of experiments. They also reported several observations in field data which are consistent with status quo bias.

When Harvard University added new health-care plan options, older faculty members who were hired previously, when the new options were not available were, of course, allowed to switch to the new options. If one assumes that the new and old faculty members have essentially the same preferences for health care plans, then the distribution of plans elected by new and old faculty should be the same. However, Samuelson and Zeckhauser found that older faculty members tended to stick to their previous plans; compared to the newer faculty members, fewer of the old faculty elected new options.

In cases where there is no status quo, people may have an exaggerated preference for whichever option is the default choice. Johnson, Hershey, Meszaros, and Kunreuther (1993) observed this phenomenon in decisions involving insurance purchases. At the time of their study, Pennsylvania and New Jersey legislators were considering various kinds of tort reform, allowing firms to offer cheaper automobile insurance which limited the rights of the insured person to sue for damages from accidents. Both states adopted very similar forms of limited insurance, but they chose different default options, creating a natural experiment. All insurance companies mailed forms to their customers, asking the customers whether they wanted the cheaper limited-rights insurance or the unlimited-rights insurance. One state made the limited-rights insurance the default-- the insured person would get that if they did not respond-- and the other made unlimited-rights the default. In fact, the percentage of people electing the limited-rights insurance was higher in the state where that was the default. An experiment replicated the effect.