Economics of Behavioral Finance

Lecture 2

Gains and Losses

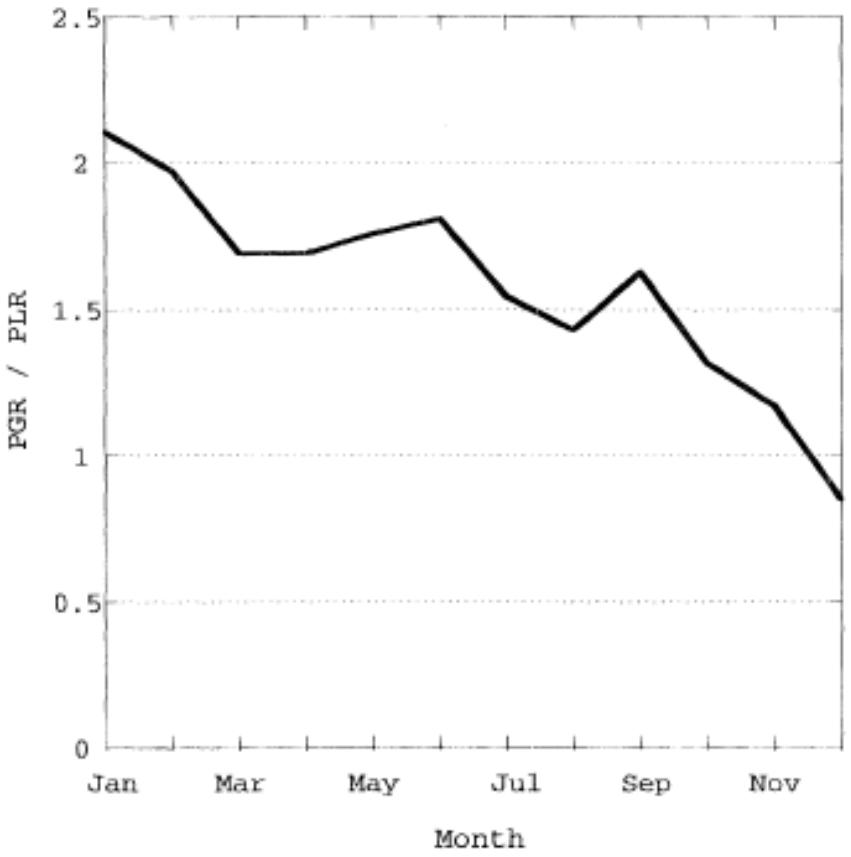
- First some definitions
  - Suppose you bought 100 shares of HSBC at $80 per share
  - If the price of HSBC is now **$90** per share, you are making a profit
  - Suppose you sell 60 of the shares, the **Percentage of Gains Realized (PGR)** = 60 shares/100 shares = 60%
  - We can definite a similar ratio if you are making a loss. We call that the **Percentage of Losses Realized (PLR)**

An Example – **Small Investors' Holdings**

- The following graph shows, for a large group of small stock investors in U.S.,

$$\frac{\%\ of\ stock\ gains\ realized}{\%\ of\ stock\ loss\ realized}$$

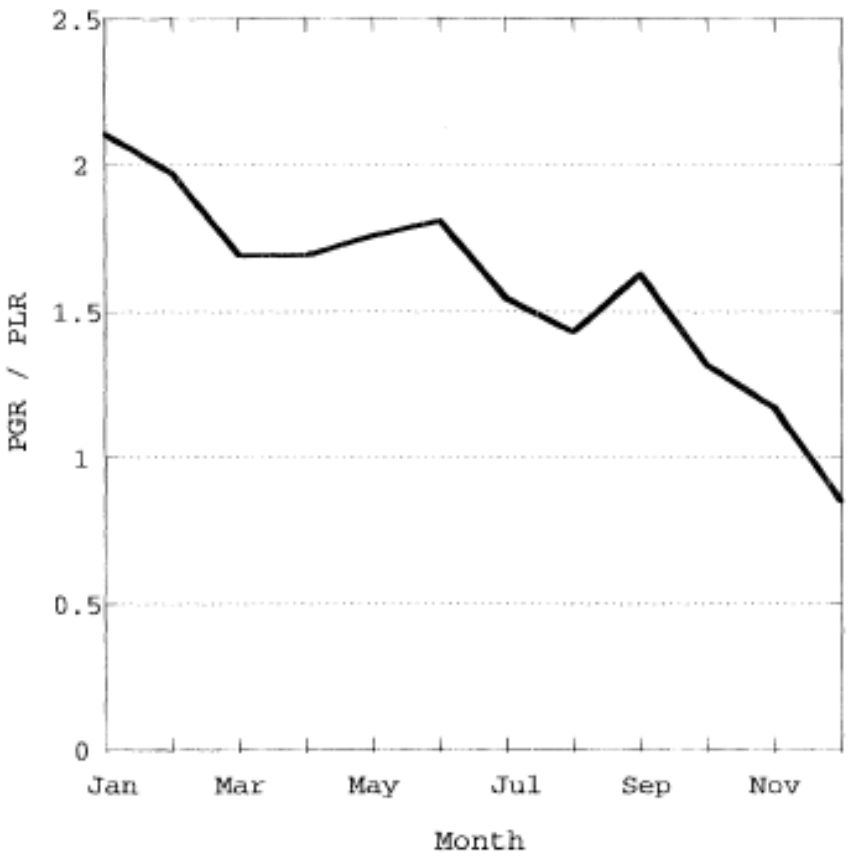
- What do you notice?
  - Gains are realized a lot more than losses



Source: Odean, Terrance. 1998. "Are Investors Reluctant to Realize Their Losses?" *Journal of Finance*.

An Example – **Small Investors' Holdings**

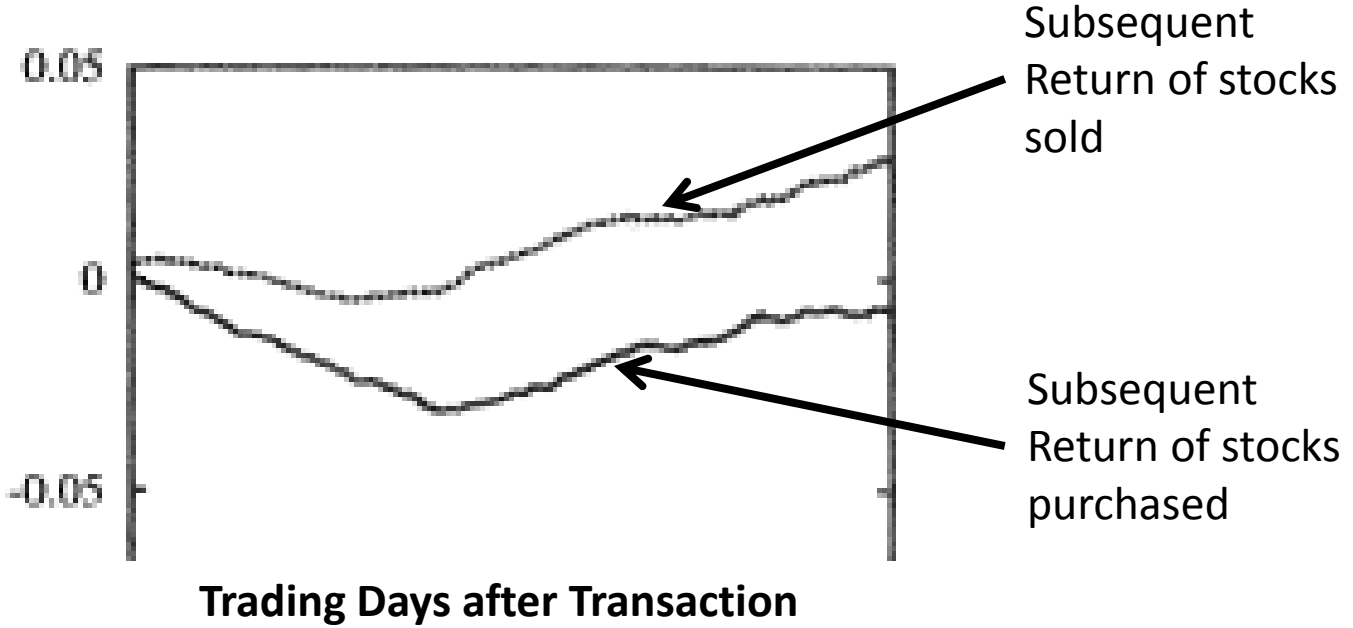
- What are small investors so much more willing to sell stocks that gained in value than those that that lost value?
  1. Do you think this is rational?
  2. Why/why not?
  3. Do you think this behavior improves or worsen the investors' portfolio performance?



Source: Odean, Terrance. 1998. "Are Investors Reluctant to Realize Their Losses?" *Journal of Finance*.

An Example – **Small Investors' Holdings**

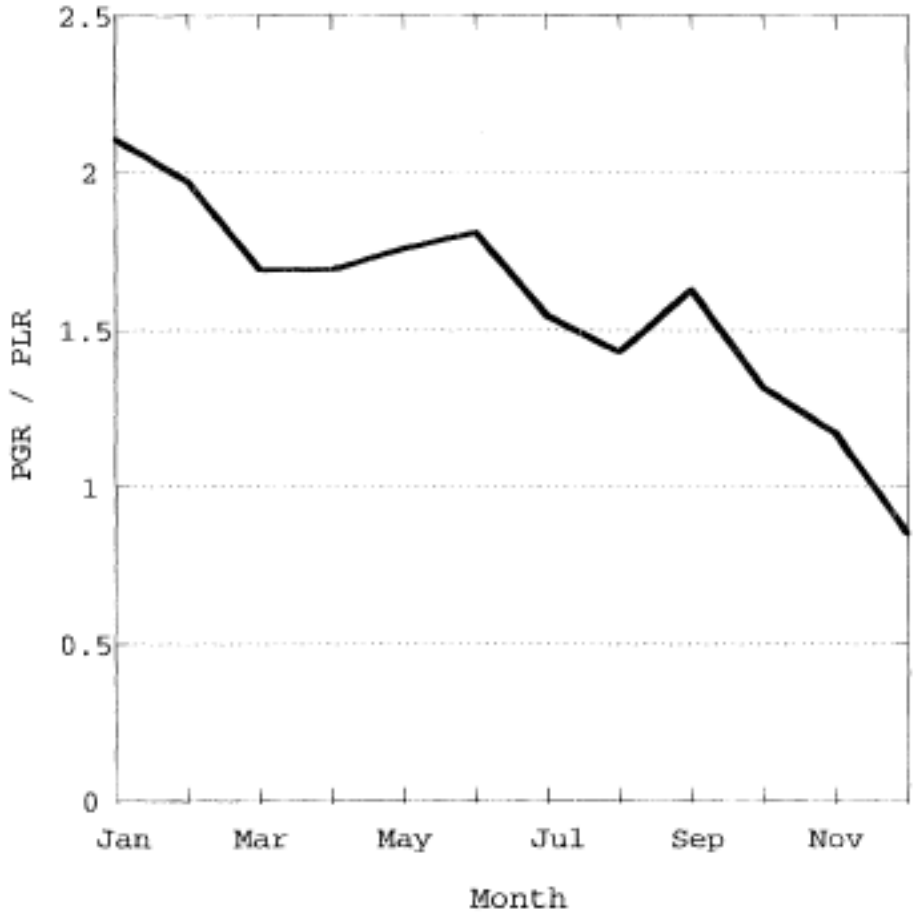
- On average the performance was worse
  - Stocks sold by small investors on average gain value later on



Source: Odean, Terrance. 1999. "Do Investors Trade Too Much?" *American Economic Review*.

Disposition Effect

Investors have a tendency to hold stocks that have lost value



Ratio of stocks sold in gain over stocks sold in loss

Possible Reasons behind Disposition Effect

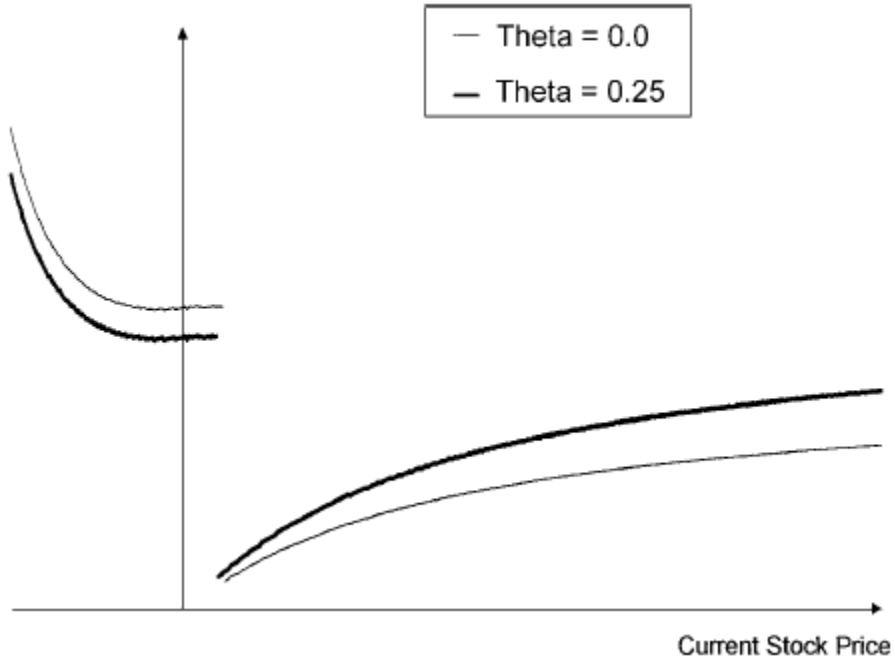
- Tax deduction
- Belief in mean-reversion
- Prospect Theory

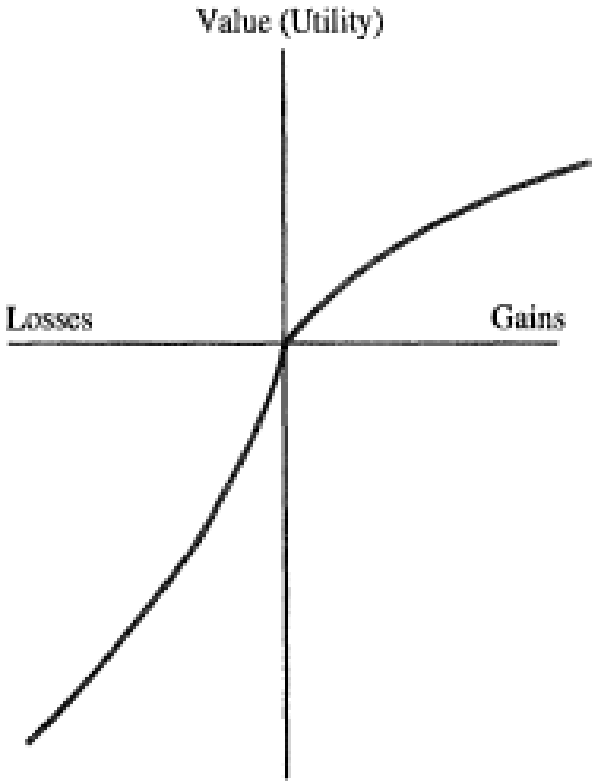
Prospect Theory and Disposition Effect

Which property of Prospect Theory could drive disposition effect?

- Diminishing-sensitivity

Demand:





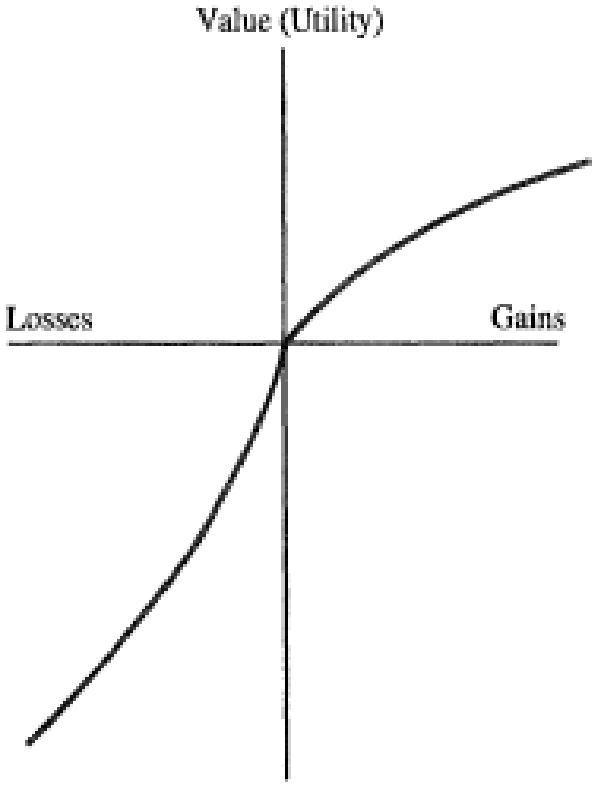
Prospect Theory and Disposition Effect

Just one problem though…

- Loss-aversion = very risk averse initially

PGR/PLR:

Expected return	Number of trading periods within the year			
μ	$T = 2$	$T = 4$	$T = 6$	$T = 12$
1.03	-	-	-	0.55/0.51
1.04	-	-	0.52/0.55*	0.54/0.52
1.05	-	-	0.54/0.53	0.59/0.45
1.06	-	0.70/0.25	0.54/0.53	0.58/0.47
1.07	-	0.70/0.25	0.54/0.53	0.57/0.49
1.08	-	0.70/0.25	0.49/0.59*	0.47/0.60*
1.09	-	0.43/0.70*	0.49/0.59*	0.46/0.61*
1.10	0.0/1.0*	0.43/0.70*	0.49/0.59*	0.36/0.69*
1.11	0.0/1.0*	0.43/0.70*	0.49/0.59*	0.37/0.68*
1.12	0.0/1.0*	0.28/0.77*	0.24/0.81*	0.40/0.66*
1.13	0.0/1.0*	0.28/0.77*	0.24/0.83*	0.25/0.78*



Source: Barberis and Xiong. 2008. "What Drives the Disposition Effect? An Analysis of a Long-standing Preference-based Explanation" *Journal of Finance*.

Prospect Theory and Disposition Effect

- Just one problem though…
  - Loss-aversion = very risk averse initially
  - Stock return has to be quite high to induce investment = further away from the reference point when stock gain value than when stock lose value
  - Curvature of utility is small except at the reference point = almost risk neutral
  - Investor might invest more after a gain than after a loss

Prospect Theory and Disposition Effect

- Gain/loss utility only over realized profit, not profit on paper
  - No change in gain/loss utility until stocks are sold
  - Initial purchase based on normal, non-gain-loss utility (e.g. CRRA)
  - If selling a stock at a gain, the gain utility enters → more incentive to sell
  - If selling a stock at a loss, the loss utility enters → less incentive to sell

Source: Barberis and Xiong. 2009. "What Drives the Disposition Effect? An Analysis of a Long-Standing Preference-Based Explanation." *Journal of Finance.*

Laboratory Experiment

Controlled experiment, subjects decides whether to buy or sell 6 assets for 14 periods

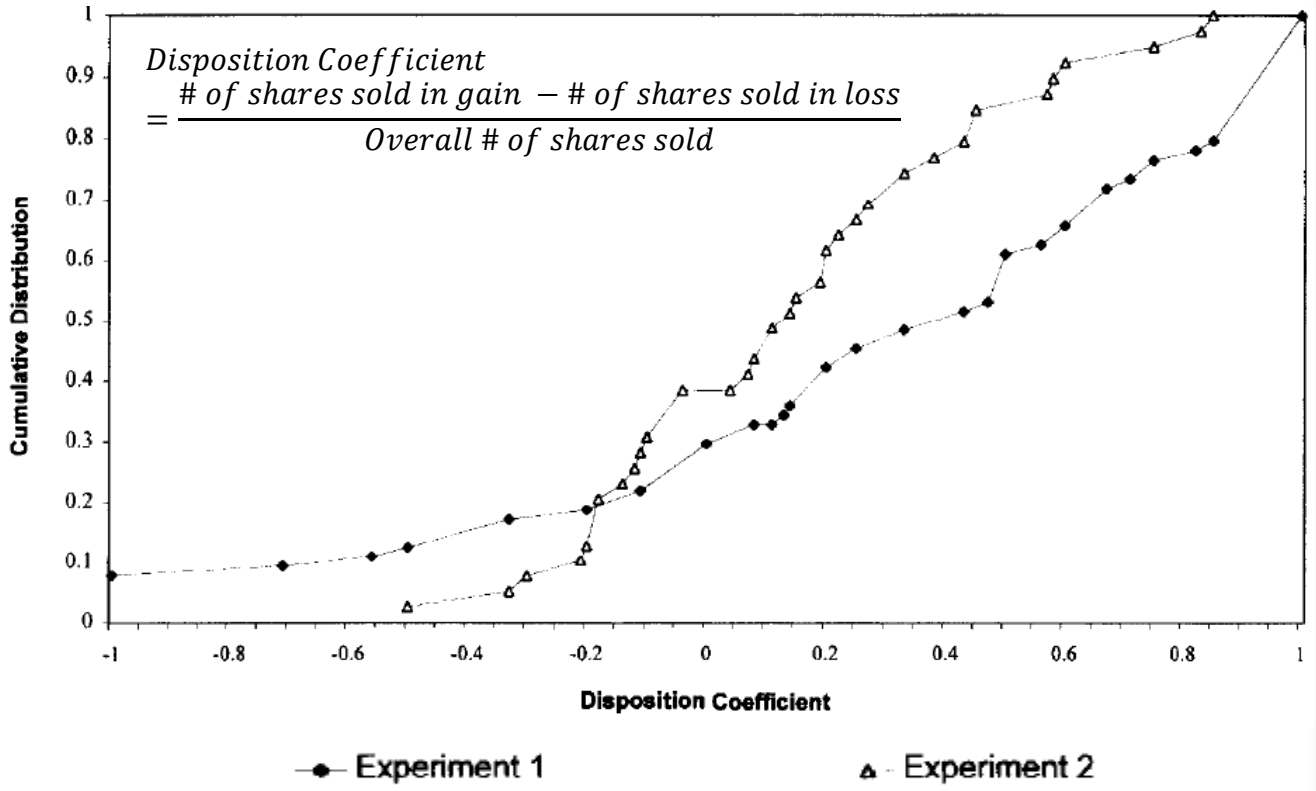
- Assets have predetermined probability of moving up

Experiment 1

- Free trading

Experiment 2

- Automatic force sell after every period



Source: Weber and Camerer. 1998. "The deposition effect in securities trading: an experimental analysis" *Journal of Economic Behavior and Organization.*

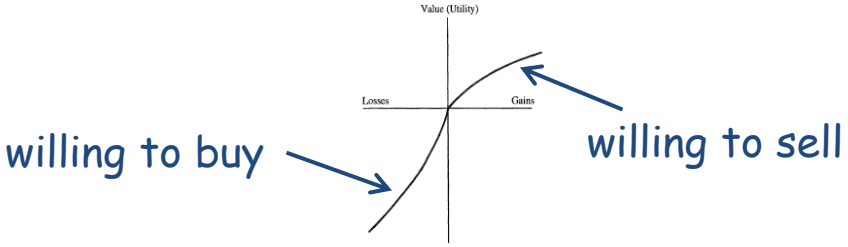
Laboratory Experiment

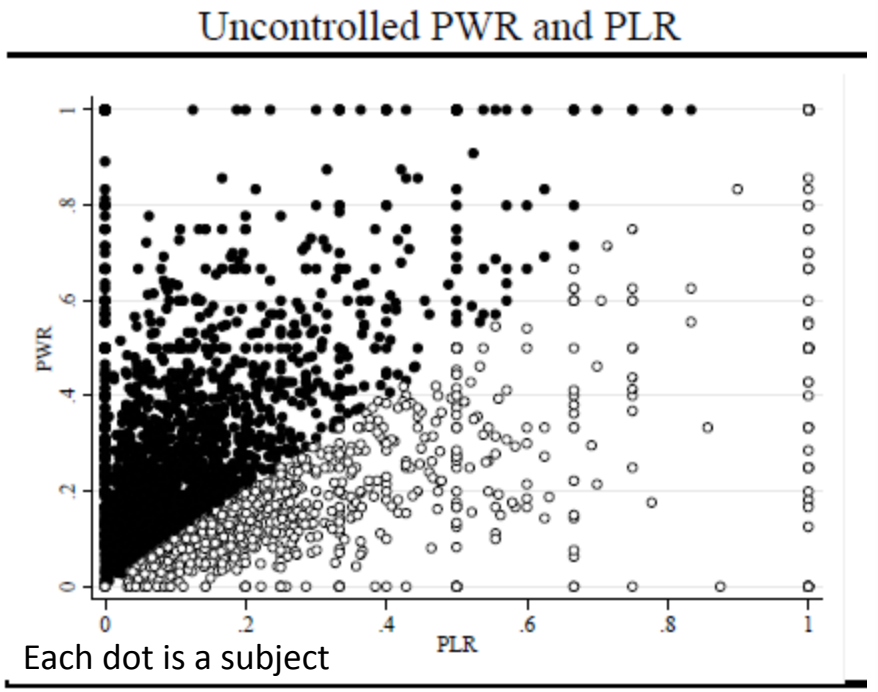
Similar setup to the previous experiment

Question at hand: is there a relationship between PGR (PWR in this paper) and PLR?

- Loss aversion implies *both* a willingness to sell at gain and a willingness to buy/hold at loss
- Overall, PGR > PLR as in previous studies
- But subjects who sell too soon are not the same subjects who hold on for too long

Source: Weber and Welfens. 2008. "Splitting the Disposition Effect: Asymmetric Reactions Towards 'Selling Winners' and 'Holding Losers'"



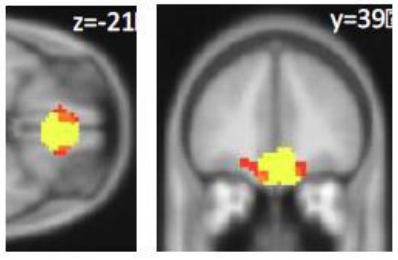


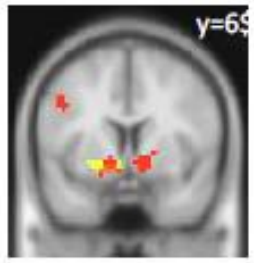
Gain/Loss Over Realized Profit

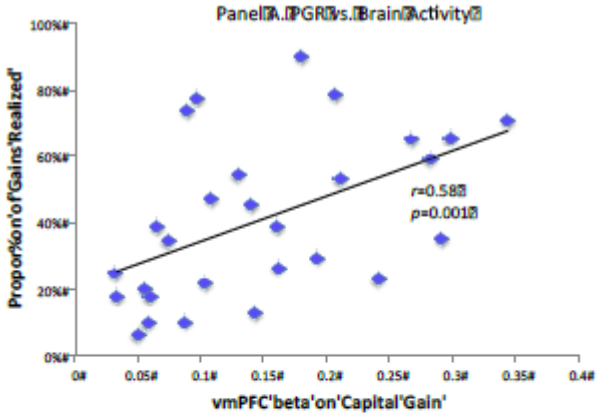
- If Gain/loss utility is only over realized profit, not profit on paper
  - Expect a burst of utility at trade
  - Expect the burst to be larger when gain/loss is large
- Neuroeconomics
  - Use fMRI to monitor brain activity when subjects make decision
  - Burst of utility corresponds to increase in brain activity of specific region

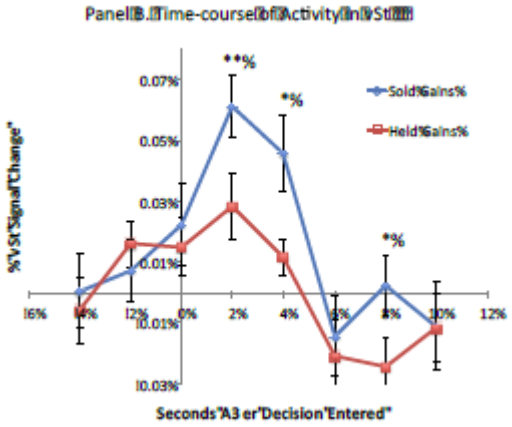
Neural Evidence

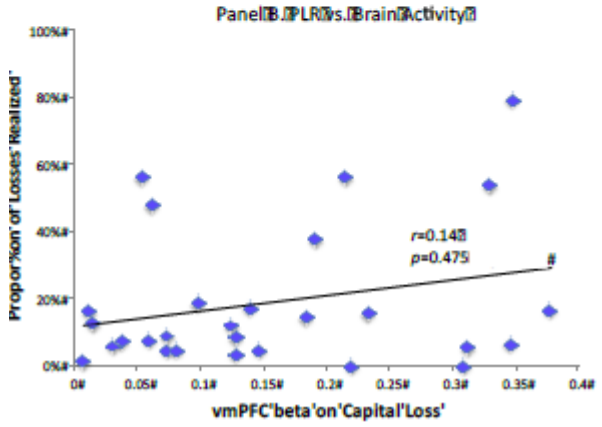
- vmPFC
  - Right behind nose bridge
  - Signals value of option
  - Strong activity when gain/loss is large
- VSt
  - Center of brain
  - Signal change in expected utility
  - Strong activity when trade occurs











Source: Fryman et al. 2014. "Using Neural Data to Test a Theory of Investor Bahavior: An Application to Realization Utility." Forthcoming in *The Journal of Finance*.