LESSONS FROM NEUROSCIENCE ON FINANCIAL DECISION MAKING

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Abstract

Using functional magnetic resonance imaging (fMRI) to analyze changes in blood flow to various parts of the brain (which represents increased use of that area of the brain), we have learned a great deal about the neural environment in which individuals make financial decisions. This paper seeks to provide a review of the recent advances in neuroscience as they relate to financial decision making. A few examples from the recent literature are included.

Camerer, Loewenstein, and Prelec (2004) provides a helpful framework for understanding financial decisions by realizing that the brain is composed of multiple interacting systems. The way in which these systems interact can have a considerable impact in the outcome of financial decisions, especially since some of these systems are state-dependent. For example, Knutson, Rick, Wimmer, Prelec, and Loewenstein (2007) identify separate parts of the brain in being associated with 1) anticipating gains (nucleus accumbens, NAcc), 2) losses (insula), and 3) integrating gains and losses (mesial prefrontal cortex, MPFC). Their study showed a product to the participant, then added the price, and then added a choice to purchase the item. Brain activation variables were significant in models predicting decisions to purchase, even when including self-reported preference and price differential.

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McClure, Laibson, Loewenstein, and Cohen (2004) provide a possible neural explanation for hyperbolic discounting. They hypothesize that "short-run impatience is driven by the limbic system…whereas long-run patience is mediated by the lateral prefrontal cortex…" (McClure, et al., 2004, p. 504). The ventral striatum (VStr), medial orbitofrontal cortex (MOFC), medial prefrontal cortex (MPFC), posterior cingulated cortex (PCC), and the left posterior hippocampus all activate more in the presence of immediate rewards. An interaction also exists between choice and brain areas, where greater activation in the limbic system is associated with choosing early, while the limbic system has less activation (relative to areas involved with all decisions) when the delayed reward is chosen.

Weierich, et al. (2011) provides a review of fMRI studies regarding age and its impact on financial decision making. Their main hypothesis is that the use of affect (i.e., relying on feelings to guide decision-making; following your gut reactions) increases with age and likely contributes to sub-optimal financial outcomes. They also highlight that the hippocampus has a role in imagining what the future will be like by combining elements from the past (i.e., memory). The hippocampus reduces in size and function with age, leading older adults to be more general (i.e., less detailed) in their future forecasts. The insula in older adults is also activated less when anticipating losses. Further, older adults have less activation in the amygdala in response to negative pictures.

A better understanding of the neuroscience of financial decision making can help financial planning researchers and practitioners alike. Researchers can arguably formulate more accurate frameworks and models in their own analyses if they have a better understanding of how individuals making financial decisions. Practitioners are able to apply these principles

directly in their work with clients. More directly, the reader can benefit personally from having a better understanding of how his or her own brain works as he or she makes financial decisions.

References

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