The rational expectation assumption, wherein agents are assumed to calculate the statistical expected values or means to facilitate decision making, has been widely adopted in modeling how decision makers form expectations under uncertainty. Although being convenient and versatile, such assumption fails to capture some commonly recognized human tendencies for biases and heuristics. In this paper, we develop a new approach for modeling how economic agents form expectations, namely the mean-deviation-and-heuristic-based (MDHB) expectation approach. Such approach allows agents to form expectations based on any point on the distribution as perceived by agents, enabling a flexible way of capturing human psychological tendency for biases like optimism and pessimism, and tendency for applying heuristics when making complicated evaluations.

We develop our model in the context of player level progression in online gaming. Players make play-or-quit decisions at each level of the game, and for each completed level, can observe their actual abilities measured by the number of points required for level completion divided by their operation quantity. We model individual players’ learning on the evolutionary patterns of their abilities, and the two alternative approaches of how players form expectations on their ability and the associated playing utility. Such expectations will then affect individual players’ decision to continue to play or quit at a level. We cast the individual play-or-quit decisions in a dynamic framework with forward looking players, and develop the algorithm for estimating such dynamic models under the MDHB expectation. We test our model using level progression data associated with an online game from 471 real players. We find clear evidence on consumer adoption of such MDHB expectation. In particular, the majority of players in the sample are found to be optimistic when forming expectations on their future playing ability and utility, and a small group of players show neither optimism nor pessimism. Comparing the two groups, we find that optimists tend to derive a higher utility from the process of playing (i.e. the “Experiencers”), whereas those realists are more goal oriented and derive a higher benefit from completing the entire game (i.e. the “Achievers”). Counterfactual analysis shows that the proposed model can help configure a more effective level-progression point schedule to better engage players and improve the game developer’s revenue potential.