Bug Bounty Programs, Security Investment and Law Enforcement: A Security Game Perspective

by

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Abstract:

Bug bounty programs are gaining popularity, but practitioners have not agreed on their effectiveness. We use a stylized model to analyze the economic trade-offs in bug bounty programs. Our analysis provides six main insights: (1) Unless a firm needs to pay an excessive bounty reward to entice a strategic hacker to participate, it is always beneficial for the firm to launch a bug bounty program. (2) The firm enjoys two benefits from a bug bounty program: attack diversion and protection delegation. (3) The firm optimally retains in-house protection; the level of in-house protection and the bounty prize depend on the balance of two incentives: bounty-payment squeezing and protection free-riding. (4) Law enforcement affects private protection only when the level of enforcement is relatively small. In this case, strengthening law enforcement increases the company’s payoff but could variously increase or decrease the strategic hacker’s payoff. Excessive enforcement may make a system less secure. (5) When the exogenous threat is significant, the company prefers a more capable participant. But when the exogenous threat is small, the company prefers a complementary participant. (6) Bug bounty programs need not provide better security protection.

Bio:

Jiali Zhou is a third year PhD student of Information Systems at Hong Kong University of Science and Technology. He is currently studying: (1) mechanisms or policies to change hacker behavior for better cybersecurity (2) the implication of competition on data privacy. He applies analytical modelling and econometrics analyses to address these questions. He holds degrees from Peking University (Guanghua School of Management) and Huazhong University of Science and Technology (School of Management), and is a awardee of Hong Kong PhD Fellowship.