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Analyzing Student Loan Debt using SEIR Compartmental Model of Epidemiology

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Student loan debt is a debilitating problem that threatens a large subset of the American population. As of February 2019, the total amount of debt in the U.S. due to student loans amounted to $1.56 trillion. This paper works to mathematically model the student debt situation from the lens of an infectious disease contagion model. The study describes a belief proliferation model. Specifically, the spread occurs through the unfounded external reassurance to students that the value of their education will amount to a future job that will enable them to pay off their loans in full and on time. Built on the classical SEIR infectious disease compartmental model, this study analyses the movement of individuals in the study set from the susceptible stage to recovered stage using interconnected differential equations. We additionally consider an enhanced model to study the potential effect of an educational awareness program through an optimal control variable that utilizes Pontyagrins maximum principle to determine the ideal control value to mitigate the rate of students refinancing their loans when unable to meet the required payments.